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MEDICO-CHIRURGICAL

TRANSACTIONS.

VOL. I.

G. WOODFALL, PRINTER,
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TRANSACTIONS,

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MEDICAL AND CHIRURGICAL SOCIETY

OF

LONDON.

VOLUME THE FIRST.

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PRINTED FOR LONGMAN, HURST, REES, AND ORME,
PATERNOSTER-ROW.

1809.

PREFACE.

On submitting to the public the first volume of the Transactions of the Medical and Chirurgical Society, the President and Council, to whom the management of its affairs is entrusted, feel it to be their duty to state the nature and objects of this Institution, and the claims which it possesses to professional patronage.

The want of a Society, founded upon liberal and independent principles, and conducted with the propriety and dignity which are worthy of the medical profession, had been long acknowledged: and a few physicians and surgeons in the year 1805, held a meeting for the purpose of considering the best means of obviating it. They invited many gentlemen of eminence to

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into the plan of this institution, to suffer its proceedings to assume the form of debate or disputation.

The formation of a select and extensive medical library for the use of its members, is an object of considerable importance with the Society, and the President and Council observe with satisfaction, that partly by donations, and partly by purchase, a considerable number of valuable works has already been obtained.

Having made this general statement, the President and Council trust, that the honourable and dignified objects of the Medical and Chirurgical Society, and the independent principles on which it was founded, will insure to it the good wishes and co-operation of their professional brethren, both in and out of the metropolis. They wish it to be as extensively useful as possible, and will therefore be glad to receive communications on subjects of medicine and surgery, or the branches connected with

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A CASE

OF

ANEURISM OF THE CAROTID ARTERY.

BY ASTLEY COOPER, ESQ. F. R. S.

SURGEON TO GUY'S HOSPITAL.

Read Jan. 29, 1806.

MARY EDWARDS, aged 44, was brought to my house by Mr. Robert Pugh, of Gracechurch-street, that I might examine a tumor in the neck, which was obviously an Aneurism of the right Carotid Artery. I advised her to become a patient in Guy's Hospital, and she was admitted on the 23d of October, 1805. The account she gave of the disease was, that the tumor appeared five months before, situated rather above the middle of the neck; its size at first being only that of the end of the finger; that it beat with very great force, and occasioned a strong pulsation in the brain; that it gradually increased upwards, until it reached the lower jaw, and extended downwards below the middle of the neck; that for a fortnight

previous to her admission, the pulsation in it and in the brain had been so strong as to prevent her sleeping; that the scalp on that side was tender, so as scarcely to bear the touch; that she had great difficulty in taking any solid food, and was constantly teazed with a violent cough.

Upon examination of the swelling I found that it occupied two-thirds of the neck; it had a very strong pulsatory motion, and the skin was thin at its most prominent part. When the swelling was examined at the hospital, great doubts were entertained if there was sufficient space between the clavicle and the tumor for the application of a ligature, and as her husband objected to the operation, she quitted the hospital.

In a few days, hearing that all her symptoms were increased, I called at her house, and strongly pointing out the probability of a fatal termination of the disease, I gained her consent and that of her relations to an operation.

On Friday, Nov. 1st, 1805, the operation was performed, in the presence of Mr. Pearce, Surgeon, and Mr. Owen, Apothecary to the Universal Dispensary, Ratcliffe Highway, of Mr. Travers, Surgeon, and that of five other Medical Gentlemen.

The tumor at this time reached from near the chin beyond the angle of the jaw, and extended

downward to within 2½ inches of the clavicle. I made an incision two inches long, on the inner edge of the sterno-mastoid muscle, from the lower part of the tumor to the clavicle, which laid bare the omo- and sterno-hyoideus muscles, which being drawn aside toward the trachea, exposed the jugular vein. The motion of this vein produced the only difficulty in the operation, as under the different states of breathing it sometimes presented itself to the knife, tense, and distended, and then as suddenly collapsed. Passing my finger into the wound to confine that vein, I made an incision upon the carotid artery, and having laid it bare, I separated it from the par vagum, and introduced a curved aneurismal needle under it, taking care to exclude the recurrent nerve on the one hand, and the par vagum on the other. The two threads were then tied about half an inch asunder, being the greatest distance to which they could be separated; I thought it proper not to run the risk of a hemorrhage by dividing the artery, as I was fearful the ligatures would be thrown off by the force of the heart, and the distance was too small to allow of any means being used to prevent it. As soon as the threads were tied, all pulsation in the tumor ceased, and the operation being concluded, and the wound superficially dressed, she rose from the chair in which she sat during the operation, and was immediately seized with a fit of coughing, which I thought would have terminated her existence. This seemed to arise from an accumulation of mucus in the trachea, which she could

not expel; it continued about half an hour when she became more tranquil.

Saturday, Nov. 2.—Mr. Owen, who had sat up with her, reported that she had slept six hours during the night, but was now and then disturbed by her cough. The pulsation in the tumor has not returned; that in the brain has ceased, and there is no appearance of diminution of nervous energy in any part of the body.

Sunday, Nov. 3.—Last night as she had some pain in her head, leeches were applied. To-day the pain in her head is gone; her cough is less troublesome; her stools and urine are natural; pulse 96.

Monday, Nov. 4.—Slept six hours last night; her spirits are good; pulse 100.

Tuesday, Nov. 5.—In the afternoon, I found her, as may be supposed contrary to my orders, sitting before the fire with three other persons, drinking tea which she swallowed with great difficulty; she had no pain in her head; her pulse 96, and the only circumstance of which she complains, is that her cough is troublesome.

Wednesday, Nov. 6.—In a violent fit of coughing last night, a slight discharge of venous blood took place from the wound. Mr. Hopkie, of Ratcliff-Highway, was called to her; but the bleeding ceased with the cough, and a piece

of lint was laid lightly on the wound; in the afternoon her cough was less troublesome; her pulse only 92.

Thursday, Nov. 7.—My colleague, Mr. Forster, accompanied me to see her and to make a drawing of the tumor, which he thought was reduced one-third. She slept eight hours last night; her pulse 94.

Friday, Nov. 8.—Evening; I was sent for by Mr. Owen and Mr. Roberts, who alternately sat up with her, on account of their observing, that her left arm and leg were paralytic. I found them benumbed, and she moved them with great difficulty; but as her pulse was weak, and she laboured under considerable constitutional irritation, I thought the powers of these parts would be restored as her health improved. She had passed a very restless night, complaining that her bones were sore, and that her teeth felt as if softened. Her head is free from pain.

Saturday, Nov. 9.—Her cough is less troublesome; her pulse is 90; her spirits good; she talks with cheerfulness, and moves her arm with more facility than yesterday. She slept eight hours last night; she said she must have something to eat; but upon attempting to swallow solids she was incapable of doing so. She has no pain either in the head or tumor, but says, when she coughs she feels a pricking pain in the wound.

Sunday, Nov. 10.—I did not see her.

Monday, Nov. 11.—She had passed a good night; her left arm she now moves with more facility, but I thought with not quite so much ease as the other. She is in good spirits, and has some appetite, but can not swallow solids. Her chief sustenance is arrow root, to which, as she had been very much accustomed to take spirits, a little wine is added.—Her cough is sometimes very violent; her pulse is only 84; the ligatures are projecting further from the wound, than at any time since the operation.

Tuesday, Nov. 12.—My colleague, Mr. Lucas, accompanied me to see the woman, this day. We found her in good spirits, and the pulse only 82, her cough less troublesome, and she was able to sit up and use her arm with so much facility that it required that the attention should be particularly directed to the part, to discover any difference in the powers of the two arms.

When the dressings were removed, the ligatures were drawn from the wound, including the intervening portion of artery. The edges of the wound were then brought together by adhesive plaster.

Wednesday, Nov. 13.—Her cough is less troublesome; she swallows liquids with more ease. The only complaint she makes is of a pain in the back, of which she was relieved by a dose of magnesia vitriolata.

Thursday, Nov. 14.—She slept eight hours last night, and her state is in every respect improved; she swallows with less difficulty; the tumor is reducing in size, and is entirely unattended with pain. As I now considered her out of danger I did not visit her on Friday or Saturday; but Mr. Jones, one of my house-pupils, visited her and found the wound nearly closed.

Sunday, Nov. 17.—I was much disappointed to find her labouring under a high degree of constitutional irritation; the tumor was also increased and very sore upon pressure; the wound was as large as immediately after the operation, and discharged a sanious serum; she complained of a great difficulty in swallowing, and of a most distressing cough after the fits of which she hooped violently; her pulse 96; and her left arm again weaker than the other.

Monday, Nov. 18.—She had passed a restless night; complains of pain in her head, and the size of the tumor has increased; there is great soreness upon the neck, when it is pressed; the pulse is quick, and the tongue is furred.

Tuesday, Nov. 19.—Her pulse is very quick; she had no sleep last night, although she took forty drops of tincture of opium; the tumor is still more increased, and the skin over it of a brownish red colour.

Wednesday, Nov. 20.—She had slept three hours last night; her pulse is 108, and small; she is unable to swallow even her saliva, which constantly dribbles from her mouth, and every attempt at deglutition, produces a violent cough.

Evening.—Her pulse 120; she is in a profuse sweat; and still unable to swallow.

Thursday, Nov. 21.—She died.

DISSECTION.

The aneurismal sac was found inflamed, and around the clot of blood which it contained, there was a considerable quantity of pus.

The inflammation extended on the outside of the sac along the par vagum, nearly to the basis of the skull.

The glottis was almost closed, and the internal surface of the trachea was inflamed, coagulating lymph adhering to its mucous membrane.

The sudden increase which the parts had undergone from inflammation, added to the size of the

tumor previous to the operation, had occasioned so much pressure upon the pharynx, that it would not easily admit a bougie of the size of a goose quill.

The nerves, as may be seen, sustained no injury, the ligature having passed between the recurrent and the artery on the one hand, and the par vagum on the other.

The cause of her death then, was the inflammation of the aneurismal sac and the parts adjacent, by which the size of the tumor became increased so as to press on the pharynx and prevent deglutition, and upon the larynx, so as to excite violent fits of coughing, and ultimately to impede respiration.

A similar event, however, may be in future prevented, by performing the operation when the tumor is small, and pressure has not been made by it upon important parts, or if it is of considerable size, as in this case, by opening the tumor and discharging the coagulum, as soon as inflammation appears. *

As I could not obtain permission to open the head, the cause of the paralysis remains unknown. It did not immediately succeed the operation, but was observed first on the eighth day after it. It

* Since this paper was read to the Society, another case has occurred which has terminated successfully, and will be given at the end of this volume.

came on whilst she laboured under great constitutional irritation, lessened as it decreased, and returned when the irritation became greater; but as it appeared that the irritation which she suffered was owing to the operation being too long deferred, it will not prevent my performing it in any case in which the disease is somewhat less advanced.

It appears that no objection can be made to this operation on account of any unusual danger of bleeding at the time the ligatures separate, since, although they were discharged from the wound on the twelfth day, and they were certainly separated from the artery on the eleventh, the ulcerated extremity of the vessel had been closed by the adhesive process and by a clot of blood which adhered strongly to its coats. Hence we may conclude, therefore, that the carotid artery may be, in this respect, as safely tied as any other artery in the body.

EXPLANATION OF THE PLATES.

PLATE THE FIRST.

FIG. I.

A. Trachea.

B. Larynx.

C. Larynx inflamed and ulcerated.

D. Jugular vein.

EE. Par Vagum.

F. Recurrent Nerve.

G. Arteria Innominata.

H. Right Subclavian Artery.

I. Carotid Artery above the tumor.

K. Carotid Artery, with a portion of it removed to shew the clot within it.

L. The Clot continued within the Arteria Innominata.

M. Clot in the Artery above the tumor.

N. The ulcerated Artery, where the ligature had been applied.

PLATE THE SECOND.

FIG. I.

A. Trachea.
B. Epiglottis.
C. Œsophagus.
D. Pharynx; contracted by the pressure of the tumor.
E. Arteria Innominata.
F. Right Subclavian Artery.
G. Par Vagum.
H. Recurrent Nerve.
I. Phrenic Nerve.
K. Aneurismal Sac.
L. Coagulum in the Aneurismal Sac.

FIG. II.

I have added to this plate a view of a Carotid Artery which had been obliterated by pressure. It was taken from a man who died in Guy's Hospital with an Aneurism in the Curvature of the Aorta.—The disease passed into the neck behind the Sternum, and reached as high as the side of the Larynx, producing great difficulty in deglutition and breathing. His mind continued perfect till his dissolution, and he had no paralytic symptoms. On examination, the left Carotid Artery was found obliterated as far as its division into external and internal.

A. The Common Carotid. B. External Carotid.
C. Internal Carotid. D. D. Par Vagum.
E. The Clot adhering to the inner coat of the artery.

Dr. Baillie has described a curious case of obliteration of this Artery, in the "Transactions of a Society for the Encouragement of Medical and Chirurgical Knowledge."

A CASE

OF

VIOLENT AND OBSTINATE COUGH,

CURED BY

A PREPARATION OF IRON.

BY CHRISTOPHER STANGER, M. D.

GRESHAM PROFESSOR OF PHYSIC, AND PHYSICIAN TO THE FOUNDLING HOSPITAL.

Read April 23, 1806.

THE organ of respiration is so essential to animal life, that whatever tends to throw light upon its disorders, or their cure, is deserving of attention.—The following case, in which the lungs were most materially affected, if not the seat of the proximate cause of the disease, affords such decisive evidence of the efficacy of an active remedy, which is seldom employed, and generally counterindicated in pulmonary complaints, that I have thought it not undeserving of being communicated to the society.

Miss M. aged 42, unmarried, of a fair complexion, lax fibre, and slender make, has been accustomed to a sedentary life and the accommodations and indulgencies which easy circumstances afford, and which, in females more especially, generally impair the constitution. Miss M. from infancy has been liable to frequent pulmonary complaints characterized by cough, pains in the thorax, hoarseness, suppression of voice, and feverish symptoms. She has seldom expectorated much; but sometimes, though very rarely, the expectoration has been tinged with blood. She has been very subject to dyspeptic complaints also; such as want of appetite, flatulence, oppression after eating; and to a torpid action of the liver and bowels, being generally either constipated or purged. About eight years ago she had a confirmed jaundice, and her countenance is generally sallow. She is liable to frequent and severe head-ache, which is brought on by very slight causes of anxiety, fatigue, or any trifling irregularity in the natural functions. The menstrual discharge has been tolerably regular as to its period of coming on; but it is generally too copious, continues longer than it ought, and is succeeded by some degree of leucorrhœa.

The skin is pale and easily chilled with cold or flushed with heat; the extremities are generally cold; the muscles pale, flaccid, and weak, and the action of the heart and arteries, slow and feeble.

There are no external marks of scrophula either

in the subject of this case, or any of her relatives whom I have seen, and from the period of life which she has attained, and the frequent violent and long continued cough to which she has been subject, without any appearance of suppuration that can be traced, it may be presumed that the lungs are free from tubercles.

We find then, in this case, marks of debility and torpor, and consequently predisposition to disease in every function, without any appearance of malconformation or natural debility of structure, which might not be consistent with general health. In consequence of the preternatural debility induced by impure air, innutritious and stimulating food, mental irritation, want of exercise, and various irregularities, a majority of females in the higher classes of society in this metropolis, are always in a state of incipient disease. The nature of the disorder is determined by the existing cause, and the head, the lungs, the liver, the stomach, the intestines, or the uterus are equally predisposed to be its seat.

In the case on which we are now treating, all these viscera were frequently the seat of disease, and if the lungs were more violently affected than the rest, it may be attributed to the natural tenderness of that organ, to its constant exposure to the impurities and vicissitudes of the atmosphere, and to its peculiar connection with the skin, which in females

is very partially defended from cold and exposed to great vicissitudes. Repeated attacks had undoubtedly weakened this organ, and rendered it not only liable to be disordered by those causes which more immediately affect it, but to renew diseased action from sympathy with other diseased viscera.

From the influence of these causes, Miss M. had rarely been free from a cough for any considerable period, which, prior to my seeing her, had always been treated upon the antiphlogistic plan; was tedious in its duration, and frequently so much reduced her strength as to render it necessary for her to go into the country, where air and exercise restored her to a moderate share of health.

About ten weeks ago I was called in, when she was thought by her friends to be in an advanced state of consumption. She laboured under a very violent cough, in which the inspirations were deep, the expirations loud, the paroxysms of which were brought on by any slight movement of the body, any sudden agitation of mind, or change in the temperature of the air. They often continued till she was much exhausted, and were particularly frequent and long continued during the night. What was expectorated was inconsiderable in quantity, and appeared to be the natural mucus of the trachea and bronchiæ. She complained of soreness over the greatest part of the thorax, when quiescent, and of pain when she coughed, which was most violent

about the lower part of the sternum and ribs. It was not, however, so considerable or partial, or so corroborated by other circumstances as to warrant a conclusion of pleuritic inflammation. When the patient was perfectly quiet, the pulse was slow, not exceeding sixty; but on motion the breathing was easily hurried, and the pulse consequently accelerated. The tongue was generally moist during the day, and covered with a whitish mucus, and the mouth clammy. She was not much troubled with thirst. The appetite was very bad; the stomach disposed to nausea, the bowels torpid and irregular. The skin was generally chilly or flushed; but its heat was seldom considerable. The urine was neither high coloured nor scanty, and generally deposited a sediment, sometimes of a mucous, at others of a lateritious appearance. Her bulk and strength were both much reduced.

Previously to my seeing her, a plaster of Burgundy pitch, and a blister had been applied to the sternum. Balsam of tolu, and a preparation of squills had been employed, and she was then taking kali neutralized with lemon juice, antimonial wine and anodynes. Her diet consisted almost entirely of vegetable matter and barley water.

Being of opinion, when I first saw her, that a tonic medicine, which would only stimulate in a very moderate degree, would be of advantage, to improve the appetite and restore the strength, whilst an opiate

was employed to allay the cough, I prescribed a light infusion of quassia, with neutralized ammonia; an anodyne linctus to allay the cough when violent; and an opiate at bed-time. A few days afterwards I had recourse to ipecacuanha and squills with the former medicines, and a small proportion of animal food. The cough was but slightly alleviated, and the strength but little improved. I then had recourse to pills, consisting of ipecacuanha, benzoin, calcined zinc, and extract of hemlock, with a stronger infusion of quassia, and a more liberal allowance of animal food, with table beer. Some slight improvement in appetite and strength appeared to be gained by the use of these remedies, but none that was satisfactory; and the cough and pain in the chest were but little, if at all abated. Conceiving that the cough was very much of a spasmodic nature, and that there was no local affection, but such as was induced by the violent action of the lungs, I prescribed a mixture, containing a dram of tincture of opium, to be taken in twenty-four hours; this was persisted in for a few days, with little effect in lulling the cough, and rather a prejudicial effect upon the appetite and strength. Colombo, natron, and rhubarb combined, were afterwards tried, and with some advantage, and animal food, with table beer, and a small quantity of wine were taken, but the progress in the cure was by no means satisfactory, and some more efficient remedy appeared necessary.

Finding that no increase of pain had been in-

duced by the tonic remedies and nutritious diet that had been used; that the pulse was uniformly slow when not accelerated by coughing or motion; that the urine was not scanty or high coloured; that the skin was generally cool, and the extremities deficient in warmth; that every symptom denoted diminished vital action, I determined to have recourse to a preparation of iron. Three grains of vitriolated iron, with double that quantity of kali and myrrh, were given twice a day, and animal food and malt liquor, cocoa, jelly, and nutritious food used at the same time.

In a few days I had the pleasure of finding the cough abate, and the strength improve, and the quantity of vitriolated iron in each of the draughts was gradually increased to six grains. Under this course the pulse, which in a quiescent state was generally under sixty, increased to nearly seventy beats in a minute; the skin became more florid; the appetite improved, and the patient visibly gained in bulk as well as strength. The cough gradually diminished, and the pains in the chest disappeared; sleep returned, and in less than a month after taking this powerful remedy, she went into the country in a very satisfactory state of convalescence.

There are many complaints in the lungs, inducing violent coughing, in which tonics are usually employed with advantage. In catarrhal complaints, after the inflammatory stage has subsided, when the

irritation which produces coughing proceeds from an increased effusion of the natural mucus, owing to relaxation of the bronchial glands; in the humoral asthma and the tussis senilis, in which a similar relaxation and debility may be considered as the proximate cause of the disease; in abscesses of the lungs, where the waste of strength must be counteracted by whatever can preserve it; in all these cases tonics are undoubtedly useful, and preparations of iron have been given with advantage. In hooping-cough, when inflammatory symptoms do not exist, tonics are the most efficacious remedies. In sympathetic cough, arising from weakness and an increased secretion of mucus in the stomach; they are principally to be relied on, and iron is perhaps the most efficacious.

But in the case above stated, it will be admitted that great caution in using them was necessary. The patient, though not indicating consumption from malconformation or scrophula, or the period of life, was of a very delicate make; the vessels of a very thin texture. The lungs were in so irritable a state that coughing was excited by the slightest muscular motion or admission of cold air. The pain in the chest was very considerable on coughing, and a sense of tenderness and soreness generally present, and spitting of blood had occurred on former attacks. It could not be considered as a symptomatic cough, as no other complaint had preceded or accompanied it, to which it could be referred. The stomach,

though disordered, was not more so than it had often been with little or no cough; or than might be expected in a weak person, liable to dyspeptic complaints, and having its functions disturbed by the violent action of the neighbouring viscus, by disturbed rest, and the anodynes employed to allay the cough. The distinctive symptoms of a stomach cough, the power of deep inspiration, of muscular motion, long intermissions, the aggravation after eating, the deep and hollow sound were also absent.

We may therefore, I think, conclude that the lungs were the primary seat of the disease, independently of its being referred to cold, a common cause of catarrh; and that it was protracted by peculiar debility and irritability induced in that organ, which could not be removed without invigorating the whole frame.

But what are the symptoms which authorise he employment of iron in a cough in which there is pain, dyspnea, great irritability of the lungs, and very little increase in the frequency of inspiration? I incline to think that a slow pulse in a quiescent state, would sufficiently warrant it. This cannot subsist with active inflammation of the lungs, or perhaps of any other of the viscera, nor with considerable obstruction to the transmission of blood. The original constitution, habits of life, the moderate temperature of the skin, the previous and accompanying complaints, all indicated debility in

the above case, and concurred in justifying a treatment which I hope future success will confirm.

The Lady has enjoyed good health since the treatment of her complaint, above stated, during a period of more than two years.

SOME OBSERVATIONS

RELATIVE TO THE

TREATMENT

OF

HOOPING-COUGH.

BY RICHARD PEARSON, M. D. F. A. S.

Read May 21, 1806.

ALTHOUGH I have found, as every practitioner must have done, that antimonial emetics afford very great relief in the early stage of the hooping-cough, and at a time when the patients, and especially very young patients, are oppressed and nearly suffocated by phlegm; yet I have been generally disappointed when I have attempted to *cure* this disorder, by Dr. Fothergill's emetic powder, frequently repeated, and persisted in for a considerable length of time, conformably to the directions given by that physician. In fact, when we administer that, or any other vomiting medicine, we do little more than alleviate

a particular symptom, without making much, if any, impression on the proximate cause of the disease. The cough and spasmodic affection of the respiratory organs are mitigated for the time by the administration of an emetic; but under such treatment these symptoms too commonly recur at the stated periods, with as much violence as before.

I have, therefore, found it necessary to deviate very considerably from Dr. Fothergill's plan, employing emetics much less frequently, and for a much shorter time than he directs.

After the accumulation of phlegm has been brought away by an antimonial vomit, I prescribe a medicine compounded of opium, ipecacuanha, and prepared natron. To a child between one and two years old, I give this medicine in the following proportions, viz.: one drop of tincture of opium, five drops of ipecacuanha-wine, and two grains of prepared natron, made into a small draught with syrup and water, and repeated every fourth hour, for several days; taking care to remove costiveness, whenever it occurs, by calomel and rhubarb. These draughts operate as an antispasmodic, producing at the same time some diaphoretic effect. Having stated the dose for an infant after the first year, it will be easy to apportion the quantity to other ages.

Various narcotics (such as hemlock, hyoscyamus, belladonna, &c.) have been recommended in this

disorder, by different practitioners. I am disposed to believe they have all proved serviceable, though I have never had a desire to prescribe them in the hooping-cough, myself, having always found opium to answer my purpose. And those practitioners, (I am persuaded) would have found it unnecessary to employ such a variety of narcotic drugs, if they had previously tried the effects of opium, in proper doses, and in combination with proper auxiliaries.

It is obvious, that the ipecacuanha wine, in the small doses above-mentioned, is not intended to operate as an emetic. In what manner the fixed alkali proves serviceable, I shall not at present hazard a conjecture; but I can assure the Society, that the same beneficial effects are not produced by opium and ipecacuanha alone. Perhaps the vegetable fixed alkali might answer equally well with the prepared natron; but this I cannot assert from any comparative trials*.

When, by the use of the above-mentioned medicine for some days, the hooping-cough paroxysms are ren-

* What induced me in the first instance to prescribe the prepared natron along with the ipecacuanha and opium, was the sour smell of the slimy fluid brought away by vomiting.—Perceiving the good effects of the natron, I continued it; and since that time I have always joined the alkali with the other remedies. But although that circumstance first led me to prescribe the fixed alkali in the hooping-cough; yet I am by no means disposed to refer its beneficial operation in such cases, merely to its power of correcting acidity.

dered less frequent and less violent, the ipecacuanha-wine is omitted, and a sufficient dose of the gum myrrh is substituted in its place; the quantity of opiate tincture is diminished, while the proportion of alkaline salt remains the same. The gum myrrh I have found preferable in this disorder to the Peruvian bark, especially in the instance of very young children. In the form of combination last mentioned, it proves sufficiently tonic, and at the same time has a tendency to prevent costiveness.

While I recommend to the notice of the society the medicines above-mentioned, in the treatment of hooping-cough, I wish it to be understood, that they are not to supersede the use of bleeding, blistering, and other anti-inflammatory measures whenever this disorder is accompanied with evident symptoms of pneumonia: and even when the hooping-cough is not complicated with inflammation of the lungs, yet if the respiratory action be much disturbed from spasm or otherwise, a blister may be applied at any period of the disorder with advantage.

ON A DIMINUTION

(IN CONSEQUENCE OF DISEASE)

OF THE AREA OF THE APERTURE,

BY WHICH

THE LEFT AURICLE OF THE HEART

COMMUNICATES

WITH THE VENTRICLE OF THE SAME SIDE.

BY JOHN ABERNETHY, ESQ. F. R. S.

ASSISTANT SURGEON TO ST. BARTHOLOMEW'S HOSPITAL, AND VICE PRESIDENT OF THIS SOCIETY.

Read Dec. 10, 1806.

I HAVE thought this circumstance in morbid anatomy deserving the attention of the society, as I do not find it adverted to in any books treating on that subject. Such an impediment to the easy and natural transmission of blood from one cavity of the heart to the other, has occurred to me in the course of my dissections, not unfrequently, and in various degrees. The contraction has, in some instances, been so slight, that it would have escaped my observation, had I not by remarks on former cases, been prepared to expect it; whilst in other instances, the

aperture, which ought perhaps to have been an inch and a half in diameter, was so contracted, as to render it difficult to pass a large bougie from the auricle into the ventricle. In such cases, there existed a great mechanical impediment to the circulation of the blood, producing considerable enlargement of the left auricle, and a proportionate diminution in the capacity of the left ventricle.

It is about sixteen years since I first met with a case which led me to expect such an impediment, and caused me to remark this circumstance in morbid anatomy, which till then I had never observed.—I shall briefly relate the particulars of the case, and give an account of the dissection.

A young man, about nineteen years of age, was admitted into St. Bartholomew's Hospital, with a disease which had continued to increase for three years. His body and limbs were bulky. The cellular substance beneath the skin seemed tumid, and in some places anasarcous. His legs were anasarcous, even in a considerable degree. His belly was large, and seemed to contain some water, though not sufficient to occasion a perceptible undulation. His face, like the rest of his body, appeared bloated. The skin had every where a livid appearance. The veins were slightly turgid. The breathing was frequent and laborious. He had a short cough, but with little expectoration. The pulse was uncommonly small and frequent. The turgid state of the

veins, the livid colour, the general œdema, all seemed to indicate some impediment to the circulation of the blood; and the nature and cause of such obstruction became an object of speculation with us. In endeavouring to form an opinion on that subject, the smallness of the pulse led me to believe, that the left venticle of the heart received and projected into the arteries an unusually small quantity of blood.

Notwithstanding the respiration was laborious and frequent, it still appeared too free to admit of the supposition, that the left cavities of the heart received the blood in such small portions, in consequence of an impediment to its transmission through the lungs. I therefore conjectured, that a mechanical impediment prevented the left ventricle from receiving its due quantity from the auricle, and I could suggest no other kind of impediment, but some polypous growth or unnatural tumor. The symptoms increased in severity for the course of a month, when the patient died.

DISSECTION.

The cellular substance was every where tumid with fluid, and serum was found in all the large cavities of the body. The lungs were dense, their

vessels being turgid with blood, and their cells contained much serous fluid. The right cavities of the heart were healthy in appearance, and distended with blood. The left auricle was also filled with blood, and appeared of twice its natural magnitude. The left ventricle was small and empty. On laying open the left auricle, and removing the blood which it contained, I was surprised to find the passage into the ventricle almost closed, apparently by the elevation of the mitral valves, nor could I pass even my little finger from one cavity into the other. On opening the ventricle to examine the communicating aperture more correctly, it was found to be of an elliptical form, and situated between the sides of the two pointed productions of the mitral valve. Its dimensions were not greater than would admit of the passage of a moderate sized bougie when compressed and adapted to the form of the aperture. Indeed, the opening appeared to have been in some degree torn and enlarged by the attempt to pass a finger through it. The mitral valve appeared to be a little whiter, and more opake, than natural, but not in any degree so much as we frequently meet with it, when no such contraction is produced.

I shall next submit to the society the opinions which I have formed relative to the cause and manner in which the contraction takes place; and although they may not, perhaps, appear completely satisfactory, the paper would seem to me deficient without them. The annulus venosus is a

strong callous ring by which the auricles communicate with the ventricles. If the left cavities of the heart were injected to the utmost, the ring would be probably about one inch and a half in diameter. From this circle arises that duplicature of the membrane of the heart, called the valvula mitralis, into the pointed edges of which the chordæ tendineæ are inserted. Now, if the fleshy columns which proceed from the middle of the heart are irritable, and frequently draw these tendinous chords, they will cause the two sides of the valve to approximate in a linear direction. Nay, as the base of the valve arrises from the annulus venosus, they will even produce an approximation in the sides of that aperture, and thus gradually tend to effect the kind of contraction which I have described. One cannot, however, suppose the closure of the opening to arise from such force alone, but from an alteration of structure and a new formation of parts according with the effect which this force would occasion. It might be suggested, that this was the mere effect of inflammation; but inflammation might cause thickening, or perhaps ossification of the valve, as we frequently see, without producing this contraction. When, however, inflammation takes place in the mitral valve, it will in some degree be extended to the tendinous chords which terminate in its points, and by these means to their fleshy columns, rendering them irritable, and thus producing the effect of approximating the sides of the valve in different degrees.

In the dissection which has been related we found evidences of inflammation, but not considerable in degree. That the action of the heart tends to diminish the aperture between the auricle and ventricle, is, I think, evident from examining the heart of an animal which has been bled to death when it is found in its utmost state of contraction; and then it is difficult to pass even the little finger from the auricle into the ventricle. I have, as I before said, met with various degrees of contraction in the aperture by which the two cavities of the left side of the heart communicate, in the ordinary course of dissections, and in some instances even to the extent described in the foregoing case. I knew nothing, however, of the symptoms which took place during life.

A late instance, however, has occurred in St. Bartholomew's Hospital, in which the symptoms were noted during life, and the morbid appearances after death. The dissection was made by Mr. BARNES, the House Surgeon, whose diligence and talents are, I think, likely to render service to the profession, and whose account of the dissection I here subjoin.

It will, however, be previously proper to give a brief account of the symptoms which the disease occasioned.

The patient was a woman of a thin and small form, and about thirty-eight years of age. I should

unnecessarily occupy the attention of the society, was I to detail all the particulars of the case, as they were recorded, during the patient's life. Many circumstances related to the state of the stomach and bowels, and to that of the nervous system. It seems only necessary to mention those which appear more immediately to have arisen from the mechanical impediment to the circulation of the blood; and there were (as in the former case) an extremely small and frequent pulse, a purple tint of the skin, particularly in the face; but there was no œdema, as in the preceding case. The smallness and frequency of the pulse increased, as the disease advanced, so as to render it difficult to feel and count it.

DISSECTION.

The body was opened about sixteen hours after death. The abdominal viscera were all in the usual state. On reflecting the sternum, the lungs appeared of a deep purple, and loaded with blood, the pericardium tumid with fluid; on being opened, it was found that eight or nine ounces of clear yellowish serum were collected. In order to examine the thoracic viscera more minutely, they were removed

from their situation, by dividing the trachea and large vessels at the beginning of the neck, and again at the diaphragm. The lungs, on being cut into, were found full of a dark-coloured blood, in all parts alike; nor could the edges be made to appear white by pressing the air towards them, as is usually the case. The right cavities of the heart were empty, and perfectly sound. The left auricle appeared full, distended into a smooth surface of a solid feel, and offering considerable resistance to the finger. On slitting it open, it was found to be plugged up with coagula of a firm and fibrous texture, deposited in layers, adhering pretty strongly to the internal surface, of a moderate redness. The muscular parietes of the auricle were increased in thickness. The annulus venosus appeared like a slit of about an inch in length and $\frac{1}{8}$ in breadth, with an irregular, hardened edge, feeling like cartilage, of a white colour, and admitting the fore-finger with difficulty. The apex of the ventricle was now cut off, to give a view of the opening below; it had here a nearly similar appearance, the mitral valves being much thickened, opake, and of the hardness of cartilage. It would seem that the valves were the parts most materially affected, and that the contraction was caused, as well as the shape of the opening determined, by this circumstance.

'In this case there was a much greater disease of the valve, than in the one which I first related. It is useful to shew the different circumstances in which the contraction takes place. I repeat that it is, as

far as my observation enables me to determine, a frequent occurrence in various degrees. We also meet sometimes with considerable disease of the valves with but little contraction in the passage between the auricle and ventricle; and we meet with great contraction sometimes, where but little inflammation seems to have existed. These observations shew that the contraction does not depend on inflammation alone, and led me to suppose, that it was produced in the manner that I have stated in a former part of the paper.

I shall next give an account to the society of an uncommon disease of the ovary. The body was examined by Mr. Hurlock, by whose means I obtained an opportunity of inspecting the diseased parts, and of relating the following particulars.

The ovary was formed into a very large, thick, and strong cyst, containing as much fluid and solid substances as filled a large pail, holding rather more than four gallons. The fluid substance resembled in colour and consistence a thick gruel made of oatmeal or arrow root. In quantity it was equal to one half of the contents of the cyst, for when poured off, the pail was half filled with solid balls of a globular form, having a smooth surface, and of the size of marbles or large bullets. There can be no doubt but that the solid balls were formed by the

inspissation of the fluid substance, owing probably to the absorption of its thinner parts, and that they owed their form and smoothness of surface, in a great measure, to mutual pressure and attrition; in short, that they were formed as the granules are in the sheaths of tendons. I should further mention, that hairs grew in many places on the sides of the cyst, some of which being successively detached had become conglobated together in a large ball, which measured about four inches in diameter. The hairs were cemented together by the thick fluid of the ovary; but the surface of the ball had received no smooth or white coating from it, but appeared at first sight like a ball of hair. This case is curious, rather from the rarity of its occurrence, than from its nature. A similar fluid is secreted by the sheaths of tendons and the bursæ mucosæ. It becomes firm by residence in the part, and has sometimes been expressed in this state when an opening has been made; but in general it becomes granulated by motion. It is not then wonderful that similar causes should produce similar effects, in the contents of the ovary; yet as I have not met with any record of such a case, I have been induced to communicate it to this society.

AN ACCOUNT

OF A

PECULIAR DISEASE OF THE HEART.

BY DAVID DUNDAS, ESQ.

SERJEANT SURGEON TO HIS MAJESTY.

Read Nov. 26, 1808.

THERE is a disease of the heart, which I apprehend is not very uncommon, no less than nine cases of it having, in the course of thirty-six years, fallen under my care. I have also heard of several other cases, and yet I do not believe any account of it is to be found in any medical author.

The patient complains of great anxiety and oppression at the præcordia; has generally a short cough, and a difficulty of breathing, which is so much increased by motion or by any exertion, as to occasion an apprehension that a very little additional

motion would extinguish life. There is also frequently an acute pain in the region of the heart, but not always.

The difficulty of breathing is also aggravated by taking even a small quantity of food.

He prefers lying on the back, complains of great palpitation of the heart, and violent pulsation of the carotid arteries, attended with noise in the ears and giddiness of the head.

In some cases I have found the action of the heart so very strong as to be distinctly heard, and to agitate the bed the patient is in so violently, that the pulse of the patient could be counted by looking at the motion of the curtains of the bed.

The pulse is always very quick, and is often irregular: in some cases it has been weak, but more commonly very hard.

Towards the conclusion of the disease symptoms of water in the chest take place, the legs become œdematous, and frequently a considerable collection of water is accumulated in the abdomen.

In all the cases which I have seen, this disease has succeeded one or more attacks of rheumatic

fever. In one case the affection of the heart appeared at the commencement of the rheumatic fever, and its action was so rapid, that the pulse could not be counted for many days; much difficulty of breathing and oppression attended with a sense of great debility took place, and the inflammation, pain, and swelling of the extremities, after having shifted from one joint to another for many weeks, subsided; but the affection of the heart continued, generally attended with great pain, producing in the progress of the disease, and towards its close, a considerable disposition to dropsy, under which the patient lingered for ten months.

All those I have seen afflicted with this disease were young persons; only two were above twenty-two years of age. Six of them were males, and three females.

Most of them struggled with the disease for many months. Seven of the nine have died. One I am attending at present, and I think cannot recover; and one is apparently well, having survived the attack four years. He has had no rheumatic affection for two years and a half, but the action of the heart is still very violent and easily increased by exercise. His recovery is attributed to a very strict adherence for a long time to a vegetable and milk diet, and great attention to avoid any considerable exertion.

Of the seven cases which proved fatal, six have been opened, and all of them agree in the general appearance of the heart. In all the heart was uniformly found to be enlarged, in some, the enlargement was much more considerable than in others. In one case water was found in the pericardium, in all the others the pericardium adhered to the heart. The left ventricle, in all the cases, was most enlarged in size, but not in thickness, and in most of them the heart was found of an unusually pale colour, and very soft and tender in its texture.

In one case, the examination of which was made by Mr. Chilver, in the presence of Sir Walter Farquhar, Dr. Baillie, Dr. Saunders, Dr. Gillan, and myself, Dr. Baillie thus describes the appearance of the heart. "The pericardium was found closely adhering in every part to the surface of the heart. The heart itself had increased wonderfully in size; it was at least three times the size of a healthy heart. The muscular structure was, however, not encreased in thickness beyond what it commonly is, so that its powers of action were not augmented proportionably to its bulk. As the quantity of blood in this heart was much larger than is natural, (for instead of a few ounces it contained almost a quart of blood) its powers of propelling this blood to the different parts of the body must have been much diminished below the common standard."

Mr. Thomas, of Leicester-square, gives the following account of the examination of the body of a young gentleman (who died of this disease,) at which I was prevented from being present. "The heart was somewhat larger than common, and the enlargement was confined principally to the left side. It was of a pale colour, extremely soft and tender in its texture, and its cavities were filled with coagulated blood, having but a slight cohesion of its component parts. Nothing remarkable presented itself in the right auricle and ventricle; but upon opening the the left ventricle was found an irregular excrescence of the nature of polypus, attached to, and nearly occupying the whole of one of the valvulæ mitrales."

I have an account of a case so far back as the year 1770, in which all the appearances correspond almost exactly with those in the case described by Dr. Baillie. The heart is mentioned to have been three times its usual size; the pericardium adhered to the left ventricle, which was inflamed, and was thinner than the right. Where the pericardium did not adhere, a small quantity of water was found in it.

I examined lately, the body of a young lady who died of this disease, in presence of Mr. Nixon and Mr. Jones, surgeons, at Hampton, and found the heart of an unusual size, and the pericardium adhering closely in every part to it. The substance of the heart was of a pale colour, and the texture of it was

so tender, that the finger could with great ease be pushed through it. It was chiefly enlarged on the left side, but its muscular structure was not increased in thickness. The valvulæ mitrales were edged with a substance of a spongy appearance, perhaps coagulable lymph.

I have an account of an incipient attack of this disease, judiciously and successfully treated by Dr. Pemberton. His account of the case is so very distinct, and in many respects corresponds so exactly with the disease I have described, that I will take the liberty to give it in the Doctor's own words.

"Mr. —— had been in his youth, and indeed even to the time he was taken ill, (aged 36) subject to the acute rheumatism. He had been particularly troubled with this complaint during the whole of the winter immediately preceding the affection of the heart, which took place in March. He was seized with a considerable pain at the heart, and a difficulty of respiration, great palpitation and great anxiety. He conceived that the smallest motion of the body would have instantly destroyed him, and this dread seemed to have totally bereft him of the power of utterance. He sat for six or eight hours without being able to articulate a sound, though he was conscious of what was going on about him. He had frequent rigors, and almost constant profuse sweats. Cordials of various sorts were given him, till he appeared

in a slight degree more composed, when a small quantity of blood was taken from the arm. This did not appear buffy. In about three days he ventured to move from the chair where he had remained from the first attack, but upon the slightest exertion the palpitation and anxiety were renewed. When he remained perfectly at rest the palpitation was hardly observable.

"In about a fortnight all his apprehensions of death seemed removed; but still on the most trifling exertion he was reminded of his former sufferings, so that for a month he scarcely moved at all.

"By placing the hand upon the heart, there appeared a very great throbbing, which beat up the carotids so much as to occasion a most unpleasant noise in the head.

"On considering the circumstances of this case, I was inclined to suspect that a small portion of the surface of the heart had been affected with inflammation, and that in consequence, a partial adhesion had taken place between it and the pericardium. The plan recommended, was a seton in the region of the heart, and a pill composed of three grains of the succus spissatus cicutæ, and half a grain of the powder of digitalis, three times a day, abstinence from all fermented liquors, and a moderate quantity of animal food.

"The irregular action of the heart continued at intervals for eight months, when it gradually lessened, so that in about a year there remained no symptoms of the former complaint, and Mr. —— is now (at the distance of four years) equal to undergo any exertion or fatigue without producing any irregularity of the heart's action."

The knowledge that this disease is always the consequence of, or is connected with, rheumatic affection, points out the necessity of attending to the translation of rheumatism to the chest; and shews the importance of employing very vigorous measures to remove it as soon as possible; but whenever it has made any considerable progress, I fear it will baffle every effort.

20th *November*, 1806.

Since writing the above I have been favoured by Dr. Marcet with an account of two cases of translation of rheumatism from the extremities to the chest, producing several of the symptoms I have noticed; but not in so marked a degree as in the cases I have seen. Both these patients died, and were opened, and in both of them the heart was found to be much enlarged. I also last year attended a person aged 29, who had twice had the acute

rheumatism; but having been wet through last September, was seized with shiverings, succeeded by a pain across the chest, great difficulty of breathing, which was increased by the slightest motion, a very strong palpitation of the heart, and violent action of the carotid arteries, accompanied with a sense of great debility, and an apprehension she was just going to expire.

She had been in this state for a fortnight, before I saw her. She had not been able to go to bed for many nights; her legs and thighs were much swollen, and her pulse, which was very weak, was so quick, that it could not be counted. She had no cough. She submitted to have a blister applied to the region of the heart, but would not allow an issue to be made. By the use of the digitalis her pulse became less frequent; but as it disordered her head and stomach she was obliged to relinquish it. The action of the heart now was tremendous; she daily became weaker, although her appetite continued good to the last, and she died at the end of two months.

She was opened in the presence of Mr. Taylor, of Kingston. The lungs on the left side had very little space to act in, the heart, which was enlarged to a most extraordinary size, occupying the greater part of the left side of the thorax. The lungs were found, on both sides, to have strong adhesions to the pleura; and above a pint of water was found in the cavity of the thorax. A considerable quantity of

water was contained in the abdomen. All the abdominal viscera were sound, except the spleen, which was of a much paler colour and softer texture than usual.

ON

THE GELATINE OF THE BLOOD.

BY JOHN BOSTOCK, M. D.

OF

LIVERPOOL.

Read Dec. 24, 1806.

ALTHOUGH different opinions have been entertained respecting the purposes which the blood serves in the animal œconomy, yet its obvious influence over the functions of life, has, at all times, rendered it an important object of research, both to the physiologist, and the chemist. A complete investigation of its composition and properties is, however, attended with much difficulty: it is a fluid consisting of several ingredients, possessed of qualities peculiar to themselves, and existing in a state of combination, of which we have no other example. According to the latest and most accurate analysis of this fluid, it is supposed to consist of the following parts: fibrine, albumen, gelatine, red globules, soda,

some neutral and earthy salts, a small portion of sulphur, and a peculiar phosphate of iron, all held in solution by a large quantity of water*.

The union of the fibrine and the red globules composes the basis of the crassamentum or clot, which spontaneously forms in the blood, shortly after its evacuation from the vessels. It is to the red globules that the iron is attached, and it seems probable, that from this metallic impregnation, their peculiar colour, and of course, that of the whole mass of blood is derived. The albumen, the jelly, and the different salts, all dissolved in water, constitute the serum. The characteristic property which the albumen possesses, of being concreted by heat, affords an easy method of obtaining it in a separate state; if, after being rendered insoluble by the process of coagulation, it be cut in small pieces, and digested in water, the other ingredients of the serum will remain suspended by the fluid, while the albumen itself is left behind in a state of considerable purity. By evaporating the water we obtain the jelly, but it is unavoidably mixed with the salts, from which it does not appear possible entirely to separate it; this object can only be in part accomplished, by a slow evaporation of

* Parmentier & Deyeux, Jour. Phys. T. xliv. p. 438, 9.
Birkbeck de sanguine, tent. inaug.
Thompson's Fourcroy, V. iii. p. 270, 3.
Fourcroy, Système, T. ix. p. 140.
Thomson's Chemistry, iv. 585, & seq.
Delametherie, sur les etrés, &c. T. ii. p. 148.

the water, in consequence of which, a portion of the salts will assume their regular crystalline form, and may be thus removed from the mass. The small quantity of sulphur which exists in the blood, appears to be united to the albumen; it has, however, never been obtained in a separate form, and its existence must be regarded as somewhat problematical. That part of the serum, which remains fluid, after the albumen has been coagulated by heat, to which the name of *jelly* or *gelatine* has been applied, is the last of the constituents of the blood, the presence of which has been distinctly ascertained, and it is the one to which in the present paper I propose principally to direct my attention.

In order to give a complete account of the subject, it will be necessary to review the different opinions that have been successively entertained respecting the constitution of the blood in general, the denominations that have been given to its different parts, and the state of relative combination in which they have been supposed to exist. In this review, I shall not entirely confine myself to those authors who have devoted their attention expressly to this subject; I shall notice the opinions of some writers who have only incidentally mentioned it, as from such sources we are often able to ascertain with equal correctness the progressive changes which take place in our knowledge upon topics of this description. After having accomplished this object, in as brief a manner as is consistent with accuracy, I shall give

an account of some experiments that I have performed on this part of the blood, which have induced me to adopt an opinion respecting it different from that generally adopted.

We need not be long detained by the opinions of the ancients, on this subject; although they were frequently accurate in their descriptions of the phenomena of disease, and have manifested considerable diligence in anatomical investigations; of chemistry they were entirely ignorant, and their physiology was so much perverted by pre-conceived hypothesis, as to have deservedly fallen into complete neglect. According to the opinion of Galen, which, like the other opinions of this celebrated man, was implicitly adopted for some centuries, the blood consists of four parts: blood, properly so called, phlegm, bile, and black bile. Under the first denomination he appears to have included the compound of fibrine and red globules, which we call the crassamentum; the phlegm was used to designate the serum; and the title of black bile appears to have been given to the red globules at the lower part of the clot, which, in consequence of being secluded from the air, had acquired a dark hue. It is not easy to discover to which of the ingredients of the blood the name of bile was attached*.

* Galen, de elem. lib. 2. Harvey, de gen. Exer. 52.
Willisii Opera, T. i. p. 66.
Boerhaavii præl. ab Hallero, T. ii. p. 329.
Castelli Lexicon, hæma, arrhus, ichor, phlegma, &c.

The illustrious Harvey, who so successfully established the true hypothesis respecting the motion of the blood, appears to have been the first of the moderns who entertained any just conception of the nature of its composition. In his treatise on generation, published in the year 1651, he distinctly speaks of its separation into fibrous and serous parts, as effected by the process of spontaneous coagulation. At the same time he describes a third substance, which occupies the higher part of the clot, and resembles jelly, mucilage, or albumen ovi, to which he gives the title of mucago, and which he regards as the part of the blood the most abounding with spirit. Some authors have supposed, that by this substance he meant to describe the buffy coat, which occasionally appears on the surface of the blood, and others, the substance resembling cream, which sometimes floats on the serum, and was particularly attended to by Hewson and Hunter; but these opinions seem to be scarcely tenable, as this mucilaginous covering is described rather as a constant than as an accidental occurrence. Harvey is supposed to have been the discoverer of the property which the albumen possesses of being coagulated by heat*, and he says, that, by this process, the serum is converted into the peculiar mucilage described above. His claim is rested upon the following passage.—

* Haller, El. Phys. lib. v. sect. 3. § 2.
Thomson's Chem. v. iv. p. 587.

" Et quemadmodum, crudescente sanguine, parum
" admodum istiusmodi mucaginis supernatantis re-
" peritur; ita, si saniem illam a grumo separatam,
" & effusam leni foco decoxeris; eandem brevi
" in mucaginem hanc mutatum iri conspicies."—
" Quippe urina coctione non densatur in fibrosum
" mucaginem, sed potius in lixivium: aquosa au-
" tem, sive saniosa hæc pars (sanguinis) aliquandiu
" leviter cocta, in mucaginem innatantem abit:—*"

It must be confessed, that this is not a very accurate description of the process, nor does the term mucago seem at all applicable to the coagulated serum. We may perhaps explain the passage, by supposing, that the coagulation was imperfectly performed, in consequence of the heat either not being sufficiently raised, or not having been long enough applied.

A more accurate idea of the coagulable nature of the serum was entertained by Lower, who, in his treatise on the heart, published in 1669, describes the liquor pericardii as being similar to the blood, because by the application of heat, it was coagulated and converted into a white jelly†. The fact is mentioned in equally distinct terms by Willis, whose works were published shortly after his death, which took place in 1675. He supposed the blood to con-

* Harveii Exer. lii. de gen.

† Lower de corde, p. 6.

tain spirits, sulphur (from which its red colour is derived), salts, earthy matters, and water; and after a good deal of whimsical hypothesis about the analogy of the blood, first to wine, and afterwards to milk, he notices its division into the red fibrous part, and the coagulated serum. If this latter, he informs us, be exposed to the heat of a fire, it is concreted like the white of the egg, and a coagulum is likewise thrown down from it, by the addition of an acid*.

A considerable advance in our knowledge respecting the nature of the crassamentum, was made by Malpighi. In his treatise on polypi of the heart, probably written between 1670 and 1680, he combats the idea that was generally entertained, that they consisted of coagulated serum, and gives it as his opinion, that they are formed from the crassamentum of the blood. He informs us, that by repeatedly washing the clot, its colouring matter is entirely removed, and a white substance is left, which, when viewed through a microscope, exhibits a reticulated or fibrous structure, exactly resembling that of polypi. He supposes the buffy coat, ("pellea crusta") which occasionally appears on the top of the clot, to be formed of the same fibrous substance†.

The knowledge which Borelli possessed respecting the composition of the blood was still farther

* Willisii op. T. 1. p. 72. † Malpighi op. de polypo cordis.

matured. The albumen and the cruor, the parts into which the blood spontaneously separates, he conceived were themselves compounded bodies, the albumen consisting of a substance coagulable by heat, exactly like the white of the egg, and a watery serum impregnated with salts, while the clot was supposed to consist of a very glutinous substance, united to a purple juice. By repeated washing, the clot is converted into white fibres or reticulated membranes, while the red matter is carried off by the water*.

The celebrated Boyle wrote his "Natural History of the Blood," in 1683, two years after the publication of Borelli's work; but although a very elaborate performance, and of considerable length, it cannot be said to have added much to our knowledge respecting the nature of the blood. The attention of the author is almost exclusively occupied with an account of the effects of different chemical re-agents upon it, and he relates a number of processes which he performed for the purpose of obtaining, what he calls the spirit of the blood. He speaks of its division into the fibrous and serous parts, and correctly notices the effects of heat, acids, alkalis, alcohol, and the oxymuriate of mercury, in coagulating the serum.

The chemical analysis of the animal fluids was, at

* Borelli de Motu Anim. T. ii. prop. 132.

this time, pursued with great ardour; but as fire was the principal agent employed, it is not to be supposed that much important information would be obtained. Juncker is supposed to have been the first who analized the blood by destructive distillation; he resolved it into "water, spirit, volatile salt, oil, and fixed oil:"* except the water, these were all new products formed during the process. It was about this period that Leeuwenhoek entered upon his laborious microscopical researches into the nature of animal fluids, and among other curious discoveries, detected the presence of the red globules of the blood. He first announced this discovery in a letter to the secretary of the Royal Society, dated August 15th, 1673. Although he appears afterwards to have gone into much unfounded speculation respecting the composition of these globules, their existence has been since amply confirmed, and the discovery must be considered as forming an important step in the progress of our knowledge†.

It had been long known that the blood contains a saline impregnation; but the first attempt to ascertain the nature of the salts, appears to have been made by Gulielmini, who, by slowly evaporating serum upon glass, obtained them in a crystallized state, and was thus able to distinguish their figure; he acknowledges that this method was first pointed out to him by Malpighi‡. Gulielmini also paid a

* Junckeri, Chymia, p. 75. † Phil. Trans. for 1674, p. 23.
‡ Gulielmini Opera, T. ii. sect. 44.

good deal of attention to the coagulable lymph, to which he gave the name of " fibra sanguinis." He wrote his treatise on the blood in 1701. Lancisi's learned dissertation on the motion of the heart and arteries was also written early in the 18th century, and contains many observations on the nature of the blood. He directed his attention particularly to the red globules, and controverted the hypothesis of Leeuwenhoek, who conceived that each globule was composed of a series of smaller globules *.

The constitution of the blood formed a very important part of the theory of the celebrated Boerhaave, and he consequently paid much attention to its nature and properties; yet it does not appear that he materially added to the knowledge which was previously acquired upon the subject, and indeed, in some particulars, he seems to have had less accurate ideas respecting it than his contemporaries.— Leeuwenhoek's hypothesis of the progressive series of globules, was adopted by Boerhaave in its fullest extent, and formed a fundamental part of his pathological doctrines. From some passages in his writings it may be inferred, that he did not consider the serous and fibrous parts of the blood as essentially distinct from each other, nor from the red globules, but that they all consisted of the same matter differently arranged, and he even speaks of the different parts as being converted occasionally into each

* Lancisi, Opera. T. iv. de motu cord. post xvi.

other*. Boerhaave entered upon the discussion of the question, which was at one time much agitated, whether the blood was acid or alkaline, and from finding that no effervescence was produced by the addition of either acids or alkalies to it, he concluded that it possessed neither of these qualities†. It is, however, now known that this conclusion was erroneous, and we are able to perceive the source of the error into which he was betrayed.

We may notice the account that Hoffman gives of the blood, rather in consideration of his general celebrity, than from any peculiar sagacity which he displayed upon this subject. Blood, he supposes, is composed of watery, sulphureous, and earthy parts; that it is nothing more than a purple jelly, although it differs from common jelly in being more inflammable, in yielding more volatile salt and oil when distilled, and in being more fœtid when it putrefies. He concludes therefore that blood is a jelly of a more concocted or subtile kind‡.

The next account of the blood that we meet with is in Senac's elaborate dissertation on the heart. He describes in detail its different constituents, with considerable minuteness; beginning with the red globules, he afterwards proceeds to what he calls

* Boerhaave, aphor. sect. 93, 94.

———, prælect. sect. 223 & not.

† Boerhaave, chem. T. ii. proc. 114.

‡ Hoffman, Rat. Med. lib. i. sect. 1. cap. 5.

the lymph, then the gelatinous matter, the mucus, and lastly the serosity. By lymph he certainly meant to designate the part which we now call fibrine; he, however, appears to have had no very accurate conception of the difference between the fibrine and the albumen, as he says the lymph may be hardened by exposure to heat; and he also supposes that the buffy coat of inflamed blood is composed of albumen. With respect to the jelly and the mucus said to be in the blood, he seems rather to have inferred their existence from analogy, than to have actually detected their presence. He compares the jelly of the blood to that which is found in broth, and says, that it may be obtained from the blood by boiling it. The existence of mucus he infers, from the quantity of this substance which is poured out on the secreting surfaces with which the body abounds; conceiving it more probable that it should have been ready formed in the blood, than generated by glands lying contiguous to the parts. By the serosity Senac unquestionably meant the serum; he says it is coagulated by heat, and resembles the white of the egg; and he points out the particulars in which it differs from jelly*. As far as I have been able to collect, Senac is the first writer who employed the words coagulable lymph and serosity; he used the first in the same sense in which we now employ it; but he certainly considered serosity as synonimous with serum, and he does not appear to have had any

* Senac traité du cœur, liv. 3. chap. 4.

idea of the existence of that part of the blood to which some late writers have applied the term.

Not long after Senac, De Haen published some remarks upon the blood. He points out the method of obtaining the fibrine, or as he stiles it, the membrane of the blood, by rapidly stirring it, when fresh drawn, with a stick (a process which he informs us was first practised by Ruysch) or still more readily, by agitating the blood in a bottle. After noticing the resemblance of the serum to the white of the egg, he informs us, that if blood be suffered to flow into warm water, a substance is procured from it which he calls "gelatum." This was probably a thin film of coagulated fibrine; it certainly could not have been what has since been called the jelly of the blood.

As M. Fourcroy refers to De Haen, as the original observer of the gelatine, I shall quote at length the passage in which he describes this peculiar substance.

"Sanguinem alium ex brachio, alium ex pede
"effluentem, in aquam ad 100 gradus thermometro
"imposito calentem, excepi. Sanguis ille obser-
"vatur primo hanc aquam æquabili rubedine tin-
"gere, si jactus ejus citatus est: refrigeratæ dein
"aquæ innatat plurimum albescentis pellucidi, glu-
"tinosi, fugientis ad tactum, manu, aut cochleare
"vix capiundi; hæc si brevi a venæ sectione rem
"explores. Si vero per 8, 10 horas aqua illa post

" venæ sectionem sine examine reponatur, revoce-
" turque ad examen, habebit nonnunquam parum
" illius pellucidi glutinosi, sed multo solidius, colore
" fuscum, facilius capiendum. Hoc contentum quo
" scirem quid esset, pluries illud charta emporetica,
" linteo suffulta, percolavi: nonnunquam remansit
" nihil; aliquoties quid pauci, glutinosi, quod ex-
" siccatum furfura, griseive pulveris instar, in
" spiritu vini perstitit. Materies hæc glutinosa, ex
" aqua adhuc calente, mox a venæ sectione exceptæ,
" & vel ramulo, aut lagena, agitata, iteratis expe-
" rimentis nihil unquam dedit membranosi. Si ex-
" perimentum instituis longè post venæ sectionem,
" ubi aliquoties contenta materies solidior apparet,
" est tamen idem experimenti effectus. Hæc porro
" solidior materies, ab ea, quæ ex calente adhuc
" aqua eximitur, differt in eo, quod percolata
" plus relinquat materiæ glutinosæ fuscæ. Hanc
" superstitem a percolatione materiem per horam
" agitavi lagena, visurus num membranam daret?
" Nequaquam; agitatio illa materiem modo ex fusco
" reddidit rubicundiorem. Percolata omnium ho-
" rum experimentorum aqua rubella est, & mucosi
" quid in fundo habet. Bidui spatio omne id mu-
" cosum fere evanescit in aqua. Experimenta hæc
" sœpius, & in phlogistico sanguine, & in sano, capta
" sunt. Gelatum ergo illud, quod in aqua calida
" a misso sanguine colligitur, neque materies factitiæ
" membranæ est, ut mox ostendi, neque etiam est
" crustæ phlogisticæ materia. Est enim gelatum
" hoc in quavis aqua, in quam calentem sanguis

" sive ex brachio, influxerit. Saltem si esset crustæ
" materies, ii, quibus neque a morbo, neque a
" gravitate, neque a diathesi, crusta adesset, gelati
" carerent."*

Our knowledge respecting the blood was in this state, when in the year 1759, the celebrated Haller published the second volume of his Elements of Physiology, in which he treats with considerable minuteness, of the nature and properties of the blood. He details the opinions of many of his predecessors, and discusses the various controverted points with much of his accustomed candor and learning. We cannot, however, but remark, that this illustrious physiologist entertained less correct notions about the blood, than might have been expected from one possessed of his extensive information and indefatigable research. After noticing the separation into crassamentum, or as he calls it, cruor, and serum, and describing the former of these substances, he devotes a section to the particular examination of the latter. He supposes that it consists of water, mucus, and jelly; but it appears evident from several parts of his work, that he did not employ the term jelly in that confined sense to which it is restricted by the accuracy of modern chemistry. He seems not to have been aware of the distinction which exists between the albumen of the blood, and the jelly which is obtained by boiling the membra-

* De Haen, Rat. Med pars 1. cap. 6.

nous parts of animals; he also confounds it with the exudation which proceeds from wounded vessels, and which closes up the mouths of arteries, and he even imagined that polypous concretions, and the buffy coat of inflamed blood are formed of albumen. Hence we may safely conclude, that, although he enumerates jelly among the constituents of the serum, he was not acquainted with the substance to which the term gelatine has been since applied by Fourcroy and other later writers; there is no evidence of his having obtained it in a separate state, or even having been aware of its existence, and he evidently uses the word jelly to describe a substance of very different properties. By the mucus of the blood, Haller meant to speak of that substance which was obtained by De Haen, by permitting the blood to flow into warm water; for the proof of its existence, he refers to the passage which I have quoted above from this author. I do not find that the word serosity is mentioned by Haller in his Elements of Physiology*.

From the account which I have given of the authors who have treated of the subject before this period, we may conclude, that the existence of any animal matter in the serum, distinct from the albumen, and not coagulable by heat, was unknown to them; much less was there any idea entertained of the serum containing a proper jelly. When this

* Haller, El. Phys. lib. 5. sect. 3.

word was employed by these writers, to designate any of the constituents of the blood, they used it in a vague sense, generally applying it to the serum, but sometimes to the whole mass of the blood. We may remark that the word jellying, or some synonimous term, is frequently employed to describe the process of coagulation, both the spontaneous concretion of the crassamentum, which takes place when blood is drawn from the vessels, and the consolidation of the albumen, which is effected by heat. Of this we have the most striking illustration in the works of Haller himself, who entitles one of his sections, " Seri pars quæ cogitur, vel gelatinosa."

The publication of Haller's great work may justly be considered as forming an important æra in the history of the science; by rendering information more accessible, it tended materially to the diffusion of physiological knowledge, and thus immediately prepared the way for many important improvements. After having ascertained the state of the opinion that was entertained respecting the serum of blood at this period, I shall now proceed to trace the different changes which it has undergone until the present day.

The first clear notification which I have met with, of an uncoagulable animal matter in the serum, is in an inaugural dissertation published at Edinburgh in 1760, by Dr. Butt. After remarking the separation of the blood into serum, and crassamentum, he observes,

that serum consists of two parts, a coagulable substance, and a watery fluid, which last also exhibits marks of containing some animal matter. Dr. Butt fell into the inaccuracy, which was common among his contemporaries, of considering the albumen and coagulable lymph not to be essentially different from each other; he expressly states, that he regards the white of the egg as nothing more than coagulable lymph in its purest form*. No notice is taken of this peculiar part of the serum by Gaubius, who published his pathology in 1763; indeed he so little understood the nature of this fluid, as to conclude that its glutinous texture depended upon a mucilaginous matter, resembling vegetable gum†.

It was three years after this period, that the celebrated Cullen first gave medical lectures at Edinburgh, and I believe, it was about the same time, that he published, for the use of his class, the text book entitled "Institutions of Medicine," in which we may observe some farther advances in our knowledge respecting the constitution of the blood, although the account which he gives is still embarrassed with much inaccuracy. What had been called the fibrous part of the blood by Malpighi, Guliel-. mini, Gaubius, and others, and by Senac the coagulable lymph, Cullen denominated gluten. He observes, that when the serum has been coagulated

* Butt, p. 53. & alibi.

† Gaubii Inst. path. sect. 337, & seq.

by heat, if it be cut into small pieces, a thin fluid, of a saline taste, exudes from it; to this fluid he gave the name of serosity, and he considered the serum as formed merely by the solution of a quantity of gluten in this serosity*. Hence it appears, that he had not a distinct conception of the difference between the albumen and the gluten, nor of their relation to each other. We may remark also, that the sense in which he employed the word serosity, was very different from that given to it by its original inventor Senac; yet the wide diffusion which the opinions of Cullen would acquire, in consequence of his situation as a public teacher, necessarily gave them a great degree of currency, and we accordingly find that, from this period, the word serosity was generally restricted to the uncoagulable part of the serum.

In the year 1770, Mr. Hewson first published the result of his inquiries into the nature and constitution of the blood; some of his opinions, particularly those respecting the red particles, are now discarded, as being without foundation, but on many points he will be found to be considerably more correct than any of his predecessors. After remarking that the coagulable lymph and serum had been confounded with each other, even by the best informed writers, immediately preceding the period when he wrote, he proceeds to notice their distinctive characters, and

* Cullen's Instit. of Med. sect. 247. & seq.

after describing the coagulation of the latter substance, observes that a watery fluid may be pressed out of it, which he calls the serosity. This fluid, he says, contains the neutral salts of the blood, and also a mucilage which cannot be coagulated by heat; but if part of the water be evaporated, it then acquires a firm consistence, and resembles the mucus spit up from the lungs, when dried*. Mr. Hewson has indeed fallen into an error, in supposing that this peculiar fluid has the name of serosity given to it by Senac; this author, as we remarked above, seems to have been the first who used the word, but he applied it to the serum at large, while Cullen restricted it to this particular part of it. Gaber, who performed his experiments on pus about the time of Mr. Hewson's publication, and who imagines that purulent matter was formed from what he calls serosity, evidently intended, under this denomination, to speak of the serum at large†. Dr. Gregory, on the other hand, in his "Conspectus," uses the word serosity in the same sense with Cullen‡. I do not find that this part of the blood is noticed by Mr. Hey in his "Inquiry."

No particular alteration appears to have taken place in the opinions respecting the composition of the blood until the year 1790, when the following

* Phil. Trans. 1770; & Inquiry, passim.

† Journ. de Phys. Introd. T. ii. p. 23.

‡ Gregory, Conspect. T. i. sect. 502.

discovery was announced to the academy of sciences by M. M. Fourcroy and Vauquelin. "If serum be "exposed to heat, after being mixed with half its "weight of water, it is in part coagulated, and the "portion of liquid which is not coagulated contains "gelatine, which gelatinizes by cooling*." The discovery was developed more at large in a future paper, in which the authors inform us, that a slightly turbid fluid may be separated from coagulated albumen, which by evaporation and cooling, concretes into a substance possessing every characteristic of true jelly†. They state that this substance had been seen by De Haen, though without referring to any particular part of his treatise; but from a careful perusal of it, in connection with the references made to it by Senac and Haller, I believe there can be no doubt, that it is the passage which I have quoted above that contains the supposed discovery of De Haen. I have already stated, that I am disposed to draw a different conclusion from it.

A still more particular account of this substance is contained in a paper published by M. M. Parmentier and Deyeux in 1794. They appear at first to have entertained some doubt about the accuracy of M. Fourcroy's conclusion, and took considerable pains to ascertain the properties of this sup-

* Ann. de Chimie, T. vi. p. 182.

† Mem. Acad. Scien. 1789, p. 297.
Ann. de Chimie. T. vii. p. 146.

posed gelatine. Their experiments led them to be fully satisfied as to its existence, and they relate with minuteness, both the process which they employed to procure it, and the nature of the substance which they obtained. The properties, however, which they ascribe to it are neither essential to, nor characteristic of, jelly. They do not state that it is capable of being concreted by cold, nor do they notice the effects of any decisive chemical tests; they inform us that it is glutinous to the touch, and that when dried, it composes a hard transparent film*.

At the same time that the French chemists were thus occupying themselves with detecting the properties of this ingredient in the blood, the celebrated John Hunter, ignorant probably of their operations, was likewise engaged in examining the same substance. He describes the serum of the blood as consisting of two distinct fluids, one coagulable by heat, like the white of the egg, and the other, which remains uncoagulated. He discovered that this peculiar part of the serum is precipitated by Goulard's extract, and in this manner he attempted to ascertain the relative proportion in which this substance and the albumen of the blood existed in the blood of different individuals, and in other serous fluids which he examined. This method, however, as will afterwards appear, is totally inadequate to the purpose. None of the properties of this substance, as

* Journ. de Phys. T. xliv. p. 438, 9.

pointed out by Mr. Hunter, are at all analogous to those of jelly, nor does it appear that he, in any respect, considered it as a gelatinous fluid*.

Since this period no material change seems to have taken place in the opinion entertained respecting the constitution of the blood, at least with regard to the existence and properties of the gelatine. Those writers who have treated the subject the most copiously, Dr. Birkbeck†, Mr. Allen‡, M. Dumas‖, M. Fourcroy§, Dr. Thomson¶, and M. Delametherie**, agree in representing one of the constituents of the blood to be a proper jelly, which is liquified by heat, and congeals again by cooling, and the same opinion is maintained by Professor Blumenbach††, Mr. Hatchett‡‡, and M. Richerand§§, who incidentally mention the subject. The only author of respectability, who supports a different doctrine, is Mr. John Bell; but I conceive, that a perusal of his remarks on the blood will prove, that notwithstanding his acknowledged talents, and the acuteness with which he has detected the mistakes of others, he

* Hunter on the blood, p. 32, 3.
† Tent. Inaug. de sanguine, passim.
‡ Thomson's Fourcroy, T. iii. p. 270—3.
‖ Dumas, princip. de phys. T. ii. p. 37, 8.
§ Fourcroy, systeme, T. ix. p. 140.
¶ System of Chemistry, V. iv. p. 585. & seq.
** Delametherie, Considerations, T. ii. p. 148.
†† Blumenbach, Inst. Phys. sect. 11.
‡‡ Phil. Trans. 1800. p. 401. §§ Richerand, Elem. Phys. p. 184.

has himself, on this subject, betrayed a great deficiency of information. He says that blood consists of crassamentum, serum, and red globules, forgetting that the red globules are one of the component parts of the crassamentum; he uses the terms gluten and jelly as synonimous, and expressly states, that all attempts to distinguish between the glutinous and albumenous parts of the blood are vain and useless. Although he frequently employs the word jelly, when speaking of the constituents of the blood, it does not appear that he had any distinct conception of that part of the serum which we are now describing; indeed the whole section is so confused, that it is not easy to develope the author's exact meaning*.

Having thus completed a sketch of the opinions that have been entertained by others upon the subject, it remains for me to give an account of my own, and especially to point out the circumstances in which they differ from those of my contemporaries. Before, however, I can do this, I shall be under the necessity of adverting to some experiments that I have lately made on the analysis of animal fluids, and on the method of discriminating between those which the most nearly resemble each other in their visible properties, and which, in consequence of their being found in greater or less proportion in almost all parts of the body, I have denominated primary. Of these there are three, albumen, jelly,

* Anatomy, V. ii. p. 87, & seq.

and mucus. The distinguishing characters of the first are its being coagulable by heat, and by the oxymuriate of mercury. The second is liquefied by heat, and becomes solid again by cold, it is not affected by the oxymuriate of mercury, but is precipitated from its solution by tan; while mucus is neither coagulated by heat, nor has the power of concreting by cold, it is not affected by the oxymuriate of mercury, nor by tan, but it is copiously precipitated by the acetate of lead*.

In order to ascertain the nature of the uncoagulable part of the serum, I exposed a quantity of it for some time to the heat of boiling water; it concreted, in the usual manner, into a solid mass, but upon being divided into small pieces, and laid upon an inclined pane of glass, a brownish liquor oozed from it. The pieces of serum were afterwards digested in boiling water, which became tinged of a brown colour, owing to some substance previously contained in the serum which it had carried off. The fluid which oozed from the coagulated serum, and the water in which it had been digested, were added together. To a portion of it a small quantity of the solution of the oxymuriate of mercury being added, it became milky, and a precipitate was formed; it was also rendered opake by being for some time exposed to the boiling temperature.

* Ed. Med. Journ. V. i. p. 257. Nicholson's Journ. V. xi. p. 244.

Hence I found that it still contained some uncoagulated albumen, and in order more effectually to separate it, I diluted a quantity of serum with six times its bulk of water; to this I added the solution of the oxymuriate of mercury, until no farther precipitation could be perceived, and placed the compound in the water bath. The coagulum was by this process rendered considerably firmer than when heat only had been employed, and the liquor remained nearly transparent; it was passed through a filtre, and now no precipitate could be obtained by the addition of the infusion of tan. A quantity of the water in which coagulated serum had been digested was slowly evaporated; when the greatest part of the water was separated, it was suffered to cool, but no appearance of gelatinization was perceptible. The evaporation was then continued to dryness; a tenacious film of animal matter was left behind, which did not in any respect resemble dried jelly, and which was with difficulty re-dissolved by the addition of more water. These experiments were several times repeated, and the results were essentially the same, so far at least as affected the conclusion to be drawn from them. It is necessary, however, to remark, that in trying different specimens of serum, there was a considerable difference perceptible in the readiness with which the albumen was separated from the uncoagulable part; in some instances a single operation was sufficient, while in others it was necessary to repeat the addition of the oxymuriate of mercury and the boiling four or five

times, until the liquor which passed through the filtre was entirely freed from the uncoagulated albumen.

From these experiments I felt myself justified in concluding:—First, That when diluted serum is completely deprived of albumen, which is proved by its no longer yielding a precipitate, upon being boiled with the oxymuriate of mercury, it is not affected by the infusion of tan. Secondly, That the animal matter contained in serum, which is not coagulated by the operation of heat or the oxymuriate of mercury, does not possess the property of concreting by cold. Whence we may infer, in the third place, That that part of the serum which is not coagulable by heat does not possess the properties which are essential to jelly, either physical or chemical.

Having thus found that the uncoagulable part of the serum is not jelly, I was induced from my ideas of the constitution of animal fluids, to consider it as consisting of mucus. I have not indeed been able unequivocally to establish this opinion, for although the water in which the albumen had been digested, was very copiously precipitated by the acetate of lead, yet it might be conceived that this effect was produced by the decomposition of the different saline bodies that exist in the blood. I however, thought myself authorized in considering it to be a proper mucus, both from the nature of the precipitate produced by the acetate of lead, which ex-

hibited the peculiar flaky form, which is indicative of an animal or vegetable impregnation, and likewise from observing the appearance that it assumed by evaporation. Before I leave this part of the subject I may observe, as a confirmation of the inferences deduced from my experiments on serum, that I have had an opportunity of examining the fluids from a tumor on a diseased spine, from a case of hydrocephalus internus, and from a hydrocele, and that I could not in any of them detect the least trace of jelly.

As the opinion which is entertained, by authors of the first respectability, respecting the uncoagulable part of the serum, appears to be incorrect, it may be thought incumbent upon me to point out the circumstances which have contributed to establish the erroneous doctrine. In the first place we may observe, that a considerable degree of inaccuracy pervades the language of even the most correct writers on subjects connected with animal chemistry. The terms jellying or gelatinization, which ought to be restricted to the property that heated jelly possesses of becoming solid by cold, have been applied to every case in which a fluid substance is converted into the concrete state; whether by heat, as in the instance of the albumen, or by what has been called spontaneous coagulation, as is observed in the fibrine. This inaccuracy may probably, in the first instance, have misled M. Fourcroy, who finding these expressions employed by writers of high reputation, as

applied to the constituents of the blood, entered upon his experiments with his mind biassed in favour of the idea, that he must meet with jelly as one of its component parts. When, under this impression, he instituted his experiments upon the uncoagulable part of the serum, it is easy to conceive, that he might mistake the effects of desiccation for those of gelatinization, and as far as appears, he did not employ any other method of ascertaining the nature of the substance, than the change produced in it by the effect of heat. Indeed, although he states the fact in different parts of his works with perfect confidence, and claims the discovery, as one which he thought of importance, he no where gives us any account of the manner in which his experiments were conducted. The subject was treated much more in detail by M. M. Parmentier and Deyeux, but although they conclude in favour of M. Fourcroy's opinion, we shall not find that their results authorise this conclusion. They do not say that the substance which they obtained concreted by cold, nor do they seem to have thought of examining its nature by any chemical tests; the properties which they point out are by no means characteristic of jelly.

As to Mr. Hunter's experiments, it is obvious that they rather confirm, than oppose, the opinion that I am desirous of establishing. He found the part of the serum, which is not coagulable by heat, to be precipitable by the acetate of lead, a substance,

which is the appropriate test of mucus, and has no action upon jelly. He does not appear to have examined the effects of heat upon it. The authors who have more recently treated upon the subject appear, at least for the most part, to have taken up the opinion of the French chemists without farther examination; and indeed, after the very direct manner in which it had been stated, we can scarcely accuse them of rashness or improper confidence. Both Dr. Birkbeck and Mr. Allen, however, mention the effect of tan in throwing down a copious precipitate from the serosity, but from the way in which it was obtained, by pressing it from serum that had been exposed to heat, we must conclude, that it still contained a portion of uncoagulated albumen, which would be acted upon by the tan. Thus it appears that the erroneous opinion, which these gentlemen derived, in the first instance, from the French chemists, was confirmed by the circumstance of their operating upon the substance in an impure state.

vomiting, about half a drachm of this substance was quickly dissolved in water, and the patient being abruptly raised from the floor and strongly shaken, he opened his eyes, and seemed disposed to offer a kind of feeble resistance to the attempt he saw us about to make. We succeeded, however, in pouring into his throat about half the quantity of vitriolated copper, just mentioned, that is a dose equivalent to fifteen grains, which he swallowed with a kind of agonizing effort. Immediately after this, his countenance, which had been for an instant roused, became still more ghastly. But he had scarcely taken the dose one minute when he suddenly threw up a large quantity of a brownish fluid, which had a strong smell of laudanum, and was immediately followed by two or three more gushes of the same liquid, the whole amounting to between one and two pints. He was then made to swallow some warm water, and was dragged from one room to another, with a view to counteract the state of torpor above described. His limbs at first were quite passive and lifeless, but in a few minutes he began to rest, in some degree, on his legs, with the assistance of his friends. He continued, however, with his eyes closed, (unless roused by a loud and sudden call) his pupils dilated, and his breathing apoplectic. I strongly recommended to his friends, who fortunately were extremely active and intelligent, that he should be kept incessantly on his legs, and in constant motion about his room.

When I called again at nine o'clock in the evening, I found him so far recovered as to walk about the room supported by a friend. His countenance appeared more natural, and he was able, when urged by questions, to answer by monosyllables like a man in a state of extreme intoxication. He had vomited once or twice more since I had left him in the afternoon. He gave me to understand that he felt cold at the pit of his stomach, hot on the surface of his body, and cold in the extremities. In spite of this improvement he still slept profoundly, and snored loudly, even whilst in the act of walking about the room; and when forcibly roused, he opened his eyes for an instant and fell again into a deep slumber. Mr. Cooper saw him also in the evening, and we both agreed in recommending that he should be kept in the same state of forced activity through the night, that he should take frequent doses of assa-fœtida with volatile alkali, of camphor, or even of musk, if other stimulants did not appear sufficiently active. It was also agreed that his head should be blistered and sinapisms applied to his feet. Some tea and coffee, and likewise lemon juice, (of which he had taken small quantities during the evening with very good effect,) were directed to be frequently offered to him, and we strongly recommended that he should never be longer than half an hour at a time during the night, without being roused, in order to take either some medicines or some liquid nourishment.

On calling the next morning, (November 7th) I

learnt that he had got so much better by twelve o'clock at night, that his friends had found it unnecessary to apply the blister, and that a few doses of camphorated julep, with assa-fœtida, were the only remedies he had taken. But he had frequently sipped small quantities of tea, coffee, and lemon juice, all of which were extremely grateful to him. He was prevented from going to sleep, and kept in constant agitation by his friends, till six o'clock in the morning, when he was allowed to go to bed.

On the following morning, between nine and ten o'clock, I found him still asleep; but on my approaching his bed, he readily awoke being rather confused at first, but soon recovering himself, he said, he supposed he had slept three or four hours, which was exactly the case, and complained of his throat being sore, as if excoriated. He observed also, that a glyster which had been administered during the night, was coming away by degrees, mixed with fæces, without his being sensible of it, or able to prevent it.

On the following day (November 8,) he was able to take a walk out of doors. His appetite was not yet returned; but he was not averse to taking food. He still complained of soreness in his throat, and also at the root of his tongue, both of which were evidently the effects of the caustic antidotes he had swallowed. He had had no passage through his body since his illness, except that which was occa-

sioned by the glyster. He still looked sallow and dejected, and complained of an uneasy sensation at the pit of his stomach, not, however, amounting to pain. I advised him to take a dose of rhubarb and calomel.

In a few days after this he was perfectly recovered. The circumstances which occasioned this accident having no sort of connection with the symptoms which it produced, I have thought it useless to enter into a detailed account of them. But I should not omit to observe, that after a strict inquiry into all particulars, it was perfectly ascertained that the quantity of laudanum taken was actually six ounces.

The inference which may naturally be drawn from this case, and which, indeed, induced me to consider it as sufficiently important to be communicated to the Society, is, that neither the lapse of several hours after an accident of this kind, nor the failure of various means of relief, should prevent the administration and diligent repetition of the most powerful emetics.

A CASE

OF

EXPOSURE

TO THE

VAPOUR OF BURNING CHARCOAL.

BY WILLIAM BABINGTON, M.D. F.R.S.

SENIOR PHYSICIAN TO GUY'S HOSPITAL, AND VICE PRESIDENT OF THIS SOCIETY.

Read Jan. 7, 1807.

A CONSIDERABLE degree of interest having been excited by the melancholy accident which occurred at the Dolphin, a public-house, in Honey-lane Market, on the morning of the 24th of November last, I am induced to offer to the consideration of the Society the following statement, with some reflections on the subject of it.

William Smith, aged thirty-eight, a waiter belonging to the house, and a boy about thirteen years old had, on the preceding night, gone to their bed-

room, both in perfect health, and it was supposed under ordinary circumstances. Between six and seven o'clock in the morning, neither of them having been then seen, a person went to the chamber, and on opening the door found the waiter insensible, and apparently at the point of death; the poor lad lying lifeless on the floor, and a chafing-dish containing some extinguished charcoal placed at the foot of the bedstead. The one who still exhibited signs of life was removed into a larger and more airy apartment; and Mr. Hingeston, of Cheapside, being called, and finding that with stertorous breathing the countenance was rather flushed, the lips livid, the pulse full and strong, and as he conjectured, about ninety in the minute, was induced to take away eight, or at most ten ounces of blood from a vein in the left arm. At his request I attended to give what assistance might lie in my power. It was little more than seven o'clock when I reached the house, and having been informed of the circumstances under which these unfortunate persons had been discovered, as the respiration, pulse, and heat of him who had been removed into a cool and pure air were distinctly perceptible, I thought it my duty to determine, by actual experiment, whether any thing could be done for the recovery of his companion. With this object in view, a common sized silver catheter being passed from the mouth into the trachea, an artificial process of respiration was instituted by the aid of my friend Mr. Hingeston, and that of his assistant Mr. Gingell, alternately breath-

ing into the lungs, and forcing out the air so introduced by means of external pressure.

While these gentlemen were engaged in this process, I went to my friend Mr. Allen, in Plough Court, to request his co-operation in the trial of the galvanic influence, as one of the most ready and satisfactory modes of ascertaining whether any remains of life still existed to encourage our further exertions. In this interval the waiter, whom I had visited as I was quitting the house, had evidently become worse, and the artificial respiration having produced no effect on the boy, we passed several shocks from the galvanic trough, which we had previously found to be acting with considerable power, through his chest and head; but these being equally unproductive of any visible excitement we were reluctantly compelled to think that he had in reality passed from sleep to death. As we now perceived that the vital powers were in Smith still further enfeebled, and that unless more active steps were taken, there was reason to think that he also would fall a victim to the accident, we transferred the galvanic apparatus to his apartment, the window of which being open, and there being no fire, the temperature was necessarily that of the atmosphere, about 50 degrees of Fahrenheit. At this time his pulse, instead of being strong and full, as before the bleeding, was weak and quick, and the respirations very imperfect; but the heat of the upper part of the body remained. The power of voluntary mo-

tion was suspended, and the slight convulsive twitchings of the muscles which at first prevailed had altogether ceased; ordinary impressions no longer appeared to affect his organs of sense. His countenance was pale, the eyelids closed, the eyes prominent and rolling in their sockets from side to side; the tongue swollen and projected from the mouth, was locked in this position by a spasmodic action of the muscles which raise the lower jaw. At the corners of the mouth there was a copious discharge of frothy saliva. Having passed a galvanic shock through the chest, he instantly, to our surprise, drew his breath deep. The muscles of the abdomen were seen to re-act, though feebly, while those of the face were slightly convulsed, and the eyelids were raised. At each successive application of this powerful agent the respirations were more forcibly performed, and the stroke of the artery at the wrist rose in the same proportion. Having, between eight and nine o'clock procured a bladder filled with oxygen gas, we caused it to be inspired, and we thought that it was followed by an increased activity of the powers of respiration and circulation. As the heat of the body was not deficient, we now sprinkled the face and chest with cold water, which also had the effect of rousing the dormant powers of sensation, as the respiratory muscles were uniformly thrown by it into action, though in a more feeble and interrupted manner than when we employed the galvanic influence. About nine o'clock, having received a large supply of oxygen gas, we repeated the inhalation and the galvanic

successions alternately, through the chest and head, every half hour, till twelve o'clock, when the galvanic application was discontinued, as the heart, though uniformly excited by it, seemed in the intervals to act more feebly, and we were apprehensive that by exalting the action of one power continually, we might destroy that equilibrium of forces which is necessary to the maintenance of life. Some volatile spirit of hartshorn was rubbed upon the temples and chest, and the vapour of it inhaled; the latter rendered him uneasy and excited coughing. As the extremities were cold, bottles filled with hot water were applied to his feet, and the trunk of the body covered with the bed clothes. About one the surface became moist, and gradually a warm perspiration was diffused over the whole body. The pulse from this time was uniformly fuller and more equable in strength and frequency, and as the respirations became more free, the inhalation of the oxygen was repeated at longer intervals, and about four in the afternoon was entirely desisted from. The spasm of the jaw having subsided in a great degree, and the tongue being reduced, he was allowed some very weak wine and water, which he swallowed, a tea spoonfull at a time, without any apparent difficulty. The pulse had now risen to 120, and was strong; we, therefore, in the early part of the evening, considered of the propriety of further venæsection; but as the apoplectic stertor was evidently not so great, we determined not to interfere with the efforts of nature; accident, however, accomplished what we

had hesitated to do, the ligature having slipped from his arm, he lost, before it was noticed, nearly a pound of blood; the pulse sunk, his countenance collapsed, and Mr. Hingeston, who saw him at this period, was apprehensive that he would not survive the debilitating influence of this accidental hæmorrhage. At twelve at night he had, however, recovered from this depression; the pulse was 120, full, but soft. Repeated glysters had procured a copious stool, and fomentations of the belly had been followed by a free discharge of urine. He was now very restless, and Mr. Gingell kindly stayed with a relation of the poor man during the night, when the exertions of both were requisite to keep him from injuring himself, and rolling out of bed. On the 25th, he recovered the use of speech, though very imperfectly. The tongue, when put out, pointed to the left, and the muscles on that side of the face were slightly paralysed, as they had been occasionally observed to be on the preceding day; he complained, when questioned, of pain in his left side; referred to the spot where the wire from the galvanic trough had been applied, and also in his left arm and hand, the latter of which was swelled; the orifice in the arm did not, however, exhibit any signs of inflammation. The cough, which had occasionally distressed him the preceding day, was still rather troublesome. His mental powers seemed much impaired, and he cried bitterly when any person entered the room, a state of imbecility frequently observed in cases of ordinary palsy. He did not recollect one

event, or one sensation from the time when on lying down between the hours of eleven and twelve, he saw the charcoal burning bright, till the second or third day after the accident, when he became conscious that he was in a strange room, and felt great distress from being in a situation of which he could form no adequate and satisfactory conception. As the tongue was white, the temperature rather augmented to the touch, and the pulse full, he was kept on a low diet, and the bowels regularly purged. He progressively recovered so far as to be removed by his relations in the course of a few days.

On December 15, he called at my house; at which time he only complained of a slight degree of weakness, more particularly felt in his left arm. His appetite was good. No affection of his head, nor febrile symptoms.

W. BABINGTON.

JAN. 7, 1807.

REFLECTIONS.

THE vapour of burning charcoal has, from times of ancient date, been observed to exert a very deleterious influence on the life of animals; but it is

only within these few years that its nature has been developed, and its mode of operating fully appreciated. Modern chemistry has clearly ascertained the composition of atmospheric air, and proved that its capacity for supporting life chiefly depends upon that constituent principle which, in the language of this science, has been denominated oxygen. It has likewise instructed us that there are many other aerial fluids which possess the ordinary physical properties of the atmosphere, but differ essentially from it in not being subservient to the purposes of respiration. They have hence been distinguished from it by the general term of irrespirable airs or gases, and are destructive of life, either by the exclusion of what is necessary, or by the presence of principles directly injurious to vital energy. Even the atmosphere that we breathe may, by this very process, as well as by various circumstances of chemical combination, be either itself deteriorated, or it may be impregnated with other fluids, and thus be rendered incapable of supporting the function of respiration. We find that the burning of bodies is one of the most common, but effectual ways of producing this change, which analysis teaches us it does by the abstraction or condensation of the oxygenous portion of atmospheric air, and the evolution of new products corresponding with the nature of the inflammable substance which is made the subject of the experiment.

When charcoal in combustion combines with

oxygen we obtain carbonic acid gas, and at the same time in proportion to its moisture, more or less hydrocarbonous gas is evolved. The latter is peculiarly fatal to life, and very much increases the danger resulting from exposure to the vapour of burning fuel. The only attempt ever made to breathe it in its undiluted state with which we are acquainted, was that by Mr. Davy, who was very nearly killed by three inspirations. Even when mingled with atmospheric air it very powerfully depresses the living energy. The carbonic acid gas, when unmixed, is also very quickly destructive, and from its specific gravity being considerably greater than that of the atmosphere, it is disposed to accumulate in particular situations, and has in such proved a frequent source of death. Rozier and Davy conclude from their experiments, that the carbonic acid in its undiluted form is wholly irrespirable from its exciting a spasmodic action in which the epiglottis is closed, and the entrance of this fluid into the lungs altogether prevented. The effect produced by it therefore is similar to what occurs in the act of drowning; but if this be the case, and the carbonic acid exert no deleterious influence on the nervous and vascular systems, how shall we explain the fact, that the loss of irritability in the muscles of animals which have been destroyed by immersion in noxious airs is comparatively greater than in such as are hanged or drowned? The fatality of this gas to the different classes of animals is in general in proportion to the more complicated system of their organization. On

the human constitution according to the period of exposure and the degree of concentration, its effects vary through all the shades of giddiness, pain of the head, anxiety, depression of the powers of life, impeded respiration, loss of voluntary motion and sensation, to the complete suspension of the functions of respiration and circulation. That this pause in the series of vital phenomena shall be final, it is not necessary that any change in the structure of the body shall be observable; we have, however, no right to conclude it such, though appearances should be unfavourable, until our exertions shall have been employed in vain, or that order of combinations which tends to destroy the fabric of organised bodies shall have already commenced. We know not what life is, nor can we without the imputation of temerity speculate on the nature of that mysterious principle which regulates the functions of living beings. While, therefore, there is no apparent læsion of the system, we are called upon to rouse, if possible, its latent energies, by restoring the action of those parts which are more immediately subservient to life; and experience teaches us, that by inflating the lungs we change the condition of the blood, and that there exists a chain of connection between the circulation of blood that has undergone the respiratory process, and the maintenance of that state of the organs of sense and motion which fits them for discharging their respective offices.

Before we proceed to consider the plan followed

on the occasion which is the more immediate subject of this communication, as the inquiry involves some points of important practical moment, let us endeavour to ascertain what are the appearances which have been remarked in the bodies of animals killed by the vapour of burning fuel. We were refused permission to examine the body of the boy who died; but the researches of others inform us, that there is, in animals furnished with a double heart, a deficiency, either positive or relative, in the quantity of blood contained in the left side of the heart, and in that series of vessels which is connected with it, and an accumulation in the right side of this organ and in its dependent system; and that this condition extends to the veins of the head. In some instances also the ventricles of the brain, it is said, have been observed to contain a frothy serum, occasionally tinged with blood. The lungs have been found collapsed with more or less of frothy liquid in the bronchiæ, and the viscera of the abdomen turgid with blood. Such are the principal anatomical facts: how far do they point out an active and successful mode of proceeding?

The first, and most natural step to be taken, consists in the exposure of the person to a free and pure air, and if the respiration be impeded or suspended we should endeavour to restore this function as speedily as we can, both with a view to the chemical changes to which we have alluded, and to the mechanical effect which the inflation of the lungs

has in promoting the circulation of the blood through the minute branches of the pulmonary vessels. It has been insisted upon by very respectable authority, that the abstraction of a small quantity of blood should be the measure first adopted, in order that the heart and the large vessels may, by being relieved from their over distended state, be enabled to contract, and that the brain also may be freed from pressure. But as there is previously to the accident, no disposition to this accumulation, and as the condition of the lungs affords a mechanical obstacle to the transmission of the blood, we deem it more adviseable to remove this by causing them to expand, and if the heart should not then freely act, or the symptoms of pressure should continue equally urgent, it will be full time to have recourse to the lancet. In our patient the pulse certainly sunk after the bleeding, if not owing to this operation, and the accidental hæmorrhage which occurred in the evening, it was feared by the attendants would have proved fatal to him. In what way, may it also be asked, shall we get rid of that accumulation which occurs in the vessels of the liver and other important organs which occupy the abdominal cavity? The restoration of respiration seems to be the natural and most effectual remedy to the altered balance in the circulating system in general. If, however, the loss of blood be thought necessary, there can be little doubt that opening the jugular vein will most quickly answer the end proposed.

The inhalation of oxygen gas was directed under the idea of there being an accumulation of that carbonaceous matter which, under the ordinary circumstances of respiration is regularly thrown off; and on account of the evident depression of the vital actions produced by the noxious effects of the carbonic and hydrocarbonous gases. As far as we could judge from the state of the pulse it seemed to exert a stimulating influence on the arterial system at least. The propriety of exciting the heart by electricity previous to the establishment of the respiratory process has been questioned by many. On the present occasion we employed the galvanic modification of this principle, and its effect in promoting a deep and complete inspiration, followed by a more vigorous action of the heart and arteries was strongly conspicuous. As the galvanic apparatus is very portable, and admits of easy application, and as the evolution of this principle is not affected by the state of the atmosphere, it seems to be preferable in cases of this kind to the ordinary form of electricity. By diminishing or increasing the number of compartments when we make use of a trough, we can completely regulate the quantity of the power that we employ.

The introduction of fluids into the stomach is not an easy process in many cases of suspended animation, as trismus is by no means an uncommon occurrence. In such instances, however, this is a circumstance of secondary importance.

Portal, and other French writers, strongly recommend the employment of acids.

In Russia, where accidents of this description are very common, it is the general practice to rub the body with snow, and it is said with the happiest effect. What may be the state of the animal temperature in this affection is at present merely a matter of conjecture. The skin is for the most part warm, but as yet we have no thermometric observations. The Russian plan is probably of use, from the strong impression which is made upon the skin as a sentient organ. The sprinkling of cold water upon the face and breast is a less energetic application of the same principle, but has considerable effect in rousing persons both from this state and that of syncope. On the present occasion it constantly produced a visible and marked contraction of the respiratory muscles, though inferior in degree to that resulting from the galvanic stimulus. It is also a well known fact that the recovery of the dogs which are made the subjects of experiment in the Grotto del Cani, is much favoured by their being plunged into a neighbouring lake.

In some cases warmth may be required to be employed, and glysters form an easy mode of effecting this, and at the same time of administering stimulants.

The application of bottles filled with hot water to

the feet was the mode followed with Smith, when the apparent depression of the vital powers seemed to demand the aid of artificial heat, and it probably contributed to induce the general and copious perspiration which shortly afterwards broke out.

The torpor of the bowels and urinary organs in Smith were but a part of that general inactivity which arose from the obstructed action of the vital functions, and the directly poisonous influence of the vapour.

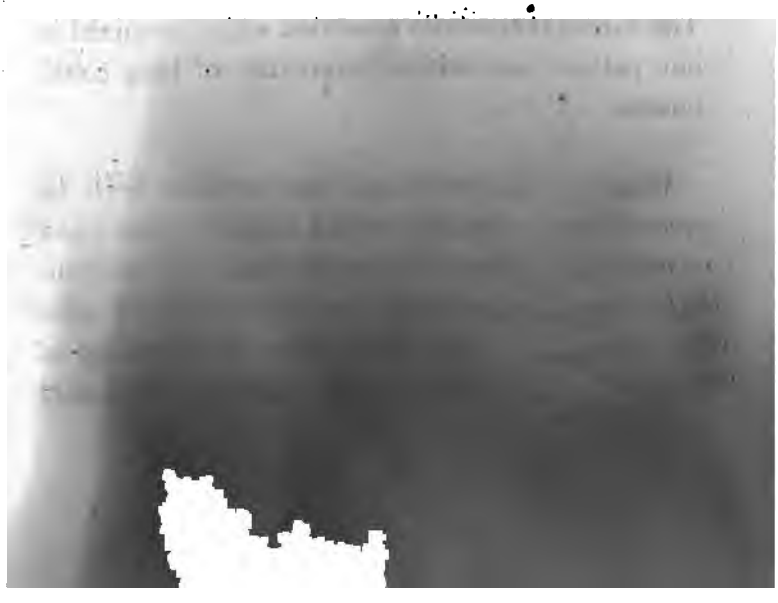
It is of advantage in such cases, to apply volatile alkali, or other pungent bodies to the inside of the nostrils. Whatever promotes sneezing or coughing gives a succussion to the diaphragm, and its antagonist muscles, and tends to re-establish the process of respiration.

Some care will be requisite in the after treatment to guard against any morbid increase of action.—The subsequent febrile condition which occurred in our patient was neither severe nor of long continuance.

Whatever plan we adopt, our measures must be promptly and steadily carried into execution; and we may expect that our perseverance will occasionally be put to the test by the interference of some officious person. We were under the necessity of using threats to one of Smith's relations, who would

willingly have consigned him to an untimely grave to free him from the misery and pain which she conceived we were cruelly inflicting. Happily, however, our endeavours to restore him succeeded. The exertions made to recover the poor boy, probably proved ineffectual, from the actions of life having been irrevocably suspended by the situation into which he was thrown. In falling out of bed, he was immediately exposed to the concentrated stratum of noxious air which occupied the lower part of the room.

It is to be regretted, that frequently as such accidents have occurred, the danger of sleeping in close rooms in which fires have been kindled, is still not sufficiently understood. From the testimony of the survivor on this melancholy occasion, it does not appear that he or his unfortunate companion were at all aware of the very perilous circumstances in which they placed themselves.



AN ACCOUNT

OF

A CASE OF LITHOTOMY,

WITH

REMARKS,

BY THOMPSON FORSTER, ESQ.

SURGEON ON THE STAFF OF THE ARMY, AND SENIOR SURGEON TO GUY'S HOSPITAL.

Read Jan. 7, 1806.

IT has been somewhere well observed, that a Physician or Surgeon of great experience, might write a very useful work, if he would have the courage to give an account only of such methods of cure, and such cases as he had found to be ineffectual, or unsuccessful. It is with this intention, and a firm persuasion of its justness in my mind, that I now venture to communicate the following case and remarks to the Society.

Henry Brand, a sickly looking boy between seven and eight years of age, was admitted into Guy's

Hospital, the sixth of August, 1804. I learned from his mother that during the preceding year he had frequently complained of an uneasy sensation, and difficulty in making water, which soon brought on great pain, fulness, and heat over the whole of his belly, attended with thirst, restlessness, and headach; she observed also, that these fits frequently lasted with great violence during two, and sometimes three days.

Some of the patient's symptoms being those of a calculus in the bladder, and his belly being much enlarged, he was ordered, during the first week after his admission, two gentle purgatives, preparatory to my passing the sound. Upon examining the penis for this purpose, I found the prepuce much elongated, thickened, and contracted, so that it was with difficulty I could find the orifice of the urethra, and when this was accomplished, the sound met with impediments from strictures; these also were overcome, and the sound, on entering the bladder, immediately struck against a stone, and by a little movement of the instrument soon passed by the side of it; but had no range, being precluded from lateral motion by the stone on one side, and the coats of the bladder on the other. A mild purgative, and the warm bath were ordered, to prevent the effects of irritation, which were likely to arise from the preceding difficulties, and in a few days the patient voided his urine much the same as before the examination.

As many of his complaints differed from the common symptoms attending a calculus in the bladder, I determined to defer the operation of lithotomy, till I should have an opportunity of seeing some of those paroxysms before mentioned, which his mother had stated to be of the most distressing kind; I therefore directed a gentle purgative for him twice a week, and soda water for his common drink.

During the fortnight he was under this plan, I observed (even when he was the most free from pain) that his pulse was quick, and feeble, his appetite uncertain, and that a general debility pervaded his whole habit; his urine was sometimes turbid, and at others, deposited a white ropy mucus; this mucus generally succeeded slight pains in his loins.

About this time I had an opportunity of observing the train of symptoms, which his mother seemed to have accurately described; they came on nearly in the following order: anxiety, restlessness, itching and heat along the course of the urethra, more particularly at the neck of the bladder; pain and difficulty in making water; heat, and distention of the abdomen; very quick and small pulse; slight nausea; increased difficulty in voiding his urine, which was soon followed by a complete suppression, so that, for four hours in the succeeding day, neither bougie, nor catheter could be passed; the warm bath and glysters gave relief, but it was four days before he returned to his usual state, and even then it was

with increased debility, and a peculiar anxiety, that gave the impression of the child's constantly feeling some internal distress.

About ten days after his recovery from this paroxysm, and when he was more than usually free from irritation, I made particular observation on the quantity of urine he generally voided at one time, which never exceeded an ounce and half, and on his power of retaining it at will; and I found that the quantity (even for eleven minutes after the usual excitement to make it had taken place) never exceeded two ounces, from which I was led to conclude, that the capacity of the bladder was considerably diminished, but that it had not lost its voluntary power of retaining the urine, or of propelling it.

I did not propose the operation at this time, from the apprehension of the consequences that I feared might ensue from such great susceptibility to inflammatory action, and from the weak state to which the patient was reduced, and I was also not without a hope, that the powers of medicine might lessen the tendency to inflammation, and restore him to a little better tone and strength to bear such an operation.

In this, however, I was disappointed; it would therefore be tedious, and intruding unnecessarily on the time of the Society, to go through the detail of medicines prescribed; suffice it to say, that they were found inadequate, either to lessen the violence of

his fits, or to augment his strength, for in the month of October he had a more than usually violent attack, that lasted him five days, and reduced him to the lowest ebb.

It was a few days after this last violent attack, that I first perceived his urine dribbled from him involuntarily, that he had a constant sense of smarting in the whole course of the urethra, and that he had lost all power of propelling the urine forward, or of retaining it. Even the action of the abdominal muscles, as in straining, produced no water from the bladder.

Here a new symptom presented itself to our notice, which is worthy of our most serious attention, namely, that of an inability in the bladder to act upon its contents, arising probably from the repeated inflammatory actions to which it had been subjected; yet the general irritability of the system remained as great as ever, and it seemed even to increase with his diminished strength.

The patient being in this wretched state, a consultation was held on the second of November, when a retrospect of his past symptoms, and a careful examination of his present ones were fully considered, and it was determined, that the operation should be immediately performed, though it was perfectly understood to be under the pressure of the most disadvantageous symptoms; yet it was thought to

hold out some faint hope of relief; and it seemed certain, that, unless it was had recourse to, he must inevitably sink, worn out by constant pain and misery.

I performed the operation next day. The obstructions in the urethra before mentioned, being with some difficulty overcome by the staff, an impediment to the full introduction of the gorget occurred, that certainly arose from the beak of the instrument coming directly against the stone, which prevented its farther introduction into the bladder, till it evidently slipped between the stone, and the coats of the bladder, where it was tightly wedged in; however as I could feel the stone with my finger at the end of the gorget, I passed the forceps, and, with considerable difficulty, expanded them sufficiently to lay hold of the stone, which broke with moderate compression. About two-thirds of it came away in the forceps, preserving so evidently its convexity, as clearly to give the form, and an idea of the quantity remaining in the bladder. This being but small, was soon removed, and the patient taken to his bed.

Symptoms of inflammation soon manifested themselves, and extended to the abdomen, loins, and thorax. The warm bath, poppy fomentations, leeches, glysters, &c. were carefully, though ineffectually, administered, as the patient died on the fourth day after the operation.

On examining the body immediately after death, the belly was observed to be of a dusky hue, emphysematous, and distended. Not getting permission at that time for farther investigation, I was obliged to wait ten days before I could give the appearances of the interior parts, which were as follows:—On dividing the integuments, the same dusky colour was noticed, which is a morbid tint, well known to those who are conversant in inspecting diseased parts, and perfectly distinct from that which is the result of putrefaction after death.

As nothing peculiar presented itself in the viscera in general, I shall confine my account to the state of the kidneys, bladder, and rectum. The left kidney was very small, loose in its texture, and its ureter scarcely discernible; the right kidney was enlarged and flabby, its ureter about the size of a goose quill, and much incrusted with calcareous matter where it entered the bladder. The bladder was very much diminished; hard, and resisting to the touch. On the left side was discovered the wound made in it by the introduction of the gorget; and a section being made through the bladder on the right side, and a portion of it removed, brought to view the great thickness of its coats, its lessened cavity, and a considerable deposit of calcareous matter adhering to the inner surface. The two plates annexed will assist in explaining this case; I took them from a portion of the parts, which from unavoidable delay were not taken out till considerable putrefac-

tion had rendered them soft, and in some degree obscure; the plates, however, portray the true character of the most prominent morbid appearances. The rectum was nearly as usual, except only, that it participated in the inflamed and discoloured appearance of all the neighbouring parts.

From the foregoing history of this case, and from studying the morbid appearances, some useful observations are deducible, that may tend to strengthen the judgement of the young practitioner, and assist him in forming his opinion, and in reasoning from the symptoms up to their causes.

To elucidate this more clearly, it may not be improper to make a short recapitulation of some of the leading symptoms. In the first place, the unusual susceptibility to inflammatory action, that shewed itself so often over the whole belly, is a symptom not very frequent, and when it does occur, is rarely overcome; moreover it appears from this case, that each succeeding inflammatory attack made such havoc in the constitution, as to bring on worse symptoms, and encreased debility. Therefore, when so alarming a symptom has clearly manifested itself, with all its train of consequences, and when the primary cause has decidedly been found to be a stone in the bladder, I should be inclined to allow but a short time for a trial of the powers of medicine to strengthen the habit and to allay such irritation, but should propose the operation at an early period, while the bladder retained

its power of acting on its contents. I am aware that this would be to perform the operation under very unfavourable circumstances, yet the case before us sufficiently shews, that there is no reason to expect any amendment can take place, whilst the original cause of the mischief remains; and it may also be observed, that in such instances, each succeeding fit renders the bladder more likely to be deprived of its muscular powers; and when such an event has actually taken place, great doubts may arise as to the propriety of venturing on the operation at all. For if the immediate cause of this privation of action should proceed either from local paralysis, or from the deposit of coagulable lymph, great impediments in either case will probably arise to obstruct the progress of healing, if not to subvert its first principles; should it arise from the former cause, the want of nervous energy might leave the wound in statu quo, till nature were quite exhausted; and if from the latter, (that is from the deposit of coagulable lymph) the muscular fibres of the bladder might be completely blocked up by such an accumulation, and the process of healing would of course be greatly impeded by this mechanical pressure, so that, though the first principles of the healing process might not be destroyed, they would be at least so far weakened as to leave great doubts of their possessing sufficient power to shoot forth the new substance necessary to complete the healing of the parts.

In the preparation before us, we see the thickened

coats of the bladder, with deposits of coagulable lymph, which must have accumulated from each successive inflammatory attack; and it seems probable, that the adhesions of calcareous matter took place, by the coagulable lymph being thrown out on its inner surface in some of the inflammations that occurred prior to the severe one, which deprived the bladder of its power of action, as, in the first passing the sound, it seemed to strike against stony matter on both its sides, in some degree, as if wedged in between two stones.

From this view of the case, it would seem, that, after the inability of the bladder to act upon its contents has shewn itself, a very different practice must follow, from that where the bladder possesses its powers of expulsion, and retention; in cases where these remain, I have recommended proceeding early to the operation for the reasons I have given, but in cases where the bladder has lost those powers, I do not think the operation advisable, or that it would be attended with success.

I must acknowledge that my reflections on this case have influenced my practice, and I have since cut, at an early period, one patient, in whom the extreme tendency to extensive inflammatory action shewed itself, nearly in as great a degree, as in the instance I have related; the inflammation from the operation was considerable, but it was moderated by the usual remedies in a few days, and in five weeks the patient was perfectly well.

Since that time I have refused to cut two patients, where the debility was considerable, and where the action of the bladder was intirely lost.

I have thus given to the Society a narration of the symptoms, progress, and fatal termination of the case in question, and of the appearances on dissection; and I am not without hopes, that the information to be derived from it may have some beneficial effect in the future treatment of similar cases. The object I have had in view, by this communication, will then be completely attained.

T. FORSTER.

Southampton-Street,
Bloomsbury-sq.

EXPLANATION OF THE PLATES.

PLATE II.

LEFT SIDE.

A. A. The extent of the wound made by the gorget.

B. The bladder, in part covered by the peritoneum.

C. C. The rectum, partly covered also by the peritoneum.

D. D. The edges of the peritoneum.

E. The penis.

F. A probe passed from the external wound in perineo into the bladder.

PLATE I.

RIGHT SIDE.

A. A. A bougie passed through the ureter, into the bladder.

B. The cavity of the bladder.

C. C. The thickened coats of the bladder.

D. D. The edges of the peritoneum.

E. The penis.

F. A probe passed through the incision in perineo into the bladder.

G. G. The integuments, with the anus, and the incision in perineo.

H. The rectum, its upper part, as well as the upper part of the bladder, covered by the peritoneum.

ON

GOUTY CONCRETIONS;

OR

CHALK STONES.

BY JAMES MOORE, ESQ.

SURGEON TO THE SECOND REGIMENT OF LIFE GUARDS.

Read March 18, 1807.

THERE has certainly been no disease more carefully investigated than the gout. Physicians, therefore, instead of being reproached on account of this malady, deserve praise for their labours. Yet no exertions of man can command success. But there are some symptoms with which the gouty are afflicted, the management of which belong exclusively to surgeons. Physicians are seldom competent to enter minutely into the treatment of those tumors and ulcers which are accompanied by chalk stones; and this subject [illegible] by surgeons, [illegible] reason that I [illegible]

the pretence of fully supplying the deficiency; but with hopes that by exciting the attention of the members of this Society to these complaints, some plan of treating them may be established; instead of their being left, as at present, to each individual, to act as his sagacity, or caprice prompts him.

The concretions which form in gouty habits are usually called chalk-stones: I shall continue to employ this term, although it is now ascertained, that they are never of a calcareous nature, but are usually composed principally of the lithic acid. The analysis of these substances I leave, however, to the professed chemists, and the theory of their formation, as well as that of gout, to speculative physicians; my intention is to give such a description as is requisite for the practical surgeon; and to point out the treatment that appears to correspond with the various circumstances.

In persons afflicted with the gout, it sometimes happens that a white liquid is effused by the exhaling arteries into internal cavities. By degrees the watery and serous particles are absorbed, leaving a substance which is at first soft and clayey, and afterwards becomes hard and friable.

This effusion occurs not only during fits of gout, but likewise in the intervals; and as the extremities, particularly the hands and feet, are the principal seat of gout, it is there, that the greatest accumula-

tions of chalk take place. Though this process is usually preceded and accompanied by inflammation, the chalk is never inclosed in a cyst, like pus in an abcess. It lies usually in the cellular membrane, in the bursæ mucosæ, or in the cavities of joints: I have even seen it thrown out between the cutis and the cuticle. But as the gouty inflammation is of the erythematous kind, there is no extravasation of coagulable lymph, and no new formed covering surrounding the chalk. This point is of the first importance, and explains many of the peculiarities of gout, which is generally considered as a phlegmon. But the absence of coagulable lymph in the inflamed parts, I consider as full evidence of the inflammation being erythematous.

The chalky liquid when first secreted gives to the finger the feeling of fluctuation, and cannot be distinguished from the ordinary serous effusion of gout. But unfortunately the absorbents cannot suck up the chalky particles. The consistence of the liquid, therefore, becomes thicker and thicker, till at last nothing remains but a hard mass. When even a considerable effusion of this kind occurs, the quantity of chalk which ultimately remains is comparatively small; as by far the greatest quantity is merely serum. It therefore usually requires repeated effusions to form any great mass of chalk, and the consistency depends upon its age, and the activity of the absorbents. The quantity at last accumulated by repeated paroxysms is in some instances

immense; which augments very seriously the sufferings of the gouty. The distress, however, is not owing to any irritating quality in the chalk, but to its obstructing the motion of the tendons and joints, occasioning often a complete anchylosis, and pressing and distending the surrounding parts by its bulk. It acts therefore by mechanically embarrassing the machine of the body, and not upon the living principle; for it will often remain for years in parts highly sensible, without exciting the slightest pain or inflammation.

Although these concretions are of so mild a nature, they often are the cause of extensive mischief; bursting externally, and occasioning ulcers very difficult to heal. When a violent fit of the gout attacks a chalky tumor, the appearance is frequently very alarming, the new paroxysm being accompanied with a fresh serous and chalky effusion, which added to the old deposit of chalk, occasions a prodigious swelling, the cutis when distended to the utmost opens; yet sometimes the cuticle remains entire. The chalky or serous liquid may then be seen through the semitransparent epidermis. The surrounding integuments appear of a deep red, or of a purple hue, threatening mortification; while the pain is excruciating.

At length the cuticle gives way; a discharge of serum and chalk takes place, and a remission of all the symptoms usually follow.

During the whole of this alarming process, suppuration never occurs; but soon after the opening has taken place, suppuration commences; and pus and chalk are then discharged from the ulcer. There are several unexpected occurrences in the progress of such ulcerations. When an opening is formed, the whole of the chalk never escapes, and its complete evacuation is usually a very tedious process.—This is owing to its being diffused through the cellular membrane, as in the cells of a sponge. One cell must sometimes give way after another, and small portions of chalk are successively thrown out; so that months, and even years pass away, before the whole is discharged. It also frequently happens, that the orifice contracts and closes over; leaving portions of chalk underneath. This kind of cicatrix sometimes stands its ground; but more commonly breaks out again and again, to discharge chalk. Even openings into joints, which are so dangerous when occasioned by other extraneous bodies, are often attended with no serious symptoms when the joint is filled with chalk. On such an accident happening, a surgeon unacquainted with these peculiarities, might be tempted to propose large openings, or even amputation, as the only resource for hindering extensive inflammation and carious bones. But if he treats the disease mildly, he will find that no such severe plans are requisite; for the parts will probably fall into a very tranquil, or indolent state: a sore will continue for a certain period, discharging pus, and occasionally a bit of chalk, till

at last the orifice will close up. Independant of the openings formed by a fit of the gout, the skin, stretched over a mass of chalk, is sometimes thinned, absorbed, and pierced by mere pressure. At other times this is effected by common inflammation and suppuration. When openings take place in these milder ways, a less quantity of chalk is usually evacuated. But this depends entirely upon the degree of inflammation. Where the suppuration is great, it naturally detaches and washes out a greater qnantity of chalk.

The last peculiarity is the rarest, namely, that a dry hard piece of chalk shall pierce the skin, and remain like an excrescence, without exciting either inflammation or suppuration.

The treatment to be adopted in these various cases is next to be considered; and it must be acknowledged, that upon this most important point our powers are extremely limited. For gouty inflammation admits of little controul; and as the lymphatics are incapable of absorbing chalk, we have no means of dispersing such tumours.

The shocking appearance of a severe fit of gout, when it attacks a part in which there is an accumulation of chalk, has been already noticed. In this situation, a warm poultice is a far better application than dry wool or flannel. If there is any threatening of gangrene, the poultices ought to be of the cor-

dial kind, into the composition of which, porter, wine, or opium should enter. Fomentations likewise sometimes give relief. If the cutis opens, yet leaves the chalky effusion confined by the cuticle only, a puncture should instantly be made. It is imprudent to touch with a lancet the organised cutis, or even to make a large opening into the cuticle, to expose internal parts in so precarious a state; nor would it be judicious at first to use pressure to squeeze out the chalk. Even a small puncture will permit some portion of the fluids to escape, and more will run out into the poultice. The tension is then removed, and the symptoms commonly improve. When the inflammation has subsided, greater freedom may be used. Some portion of the cuticle may then be removed, to facilitate the discharge; and gentle pressure may be employed.

During the violent paroxysms that have been described, if the inflamed part is threatened with gangrene, and the patient with death, the ordinary cautious treatment of gout is entirely superseded.—Bark, aromatics, volatile alkali, opium, and wine must be exhibited in doses proportioned to the danger, and to the powers of the stomach. These stimuli ought to be gradually left off, as the danger lessens.

After the violence of the fit has subsided, an ulcer frequently remains with chalk at the bottom, which renders it extremely difficult to be healed. It is bad

practice to attempt the removal of the chalk by the knife. For a wound might occasion a renewal of gout, or at least a great deal of inflammation; and as the chalk is a solid substance and dispersed in separate cells, very little could be removed by the incision. Caustics employed with caution answer better; for by destroying the membrane that confines a bit of chalk, it is often enabled to escape. Mild dressings only are to be used; stimulants, such as the hydrargyrus nitratus might excite extensive mischief; for it must always be recollected that the gouty habit is highly irritable.

It is quite impossible to prognosticate when ulcers with chalk at the bottom will heal. They sometimes become a species of issue for years, and patients flatter themselves with their being beneficial. I have not, however, seen any proof of this; nor could I observe that they diminished the frequency of fits of gout.

Masses of chalk are sometimes formed on parts so inconvenient, or occasioning such deformity, that patients are anxious to get rid of them, even at some risk. On some favourable occasions, where the constitution is sound, this may be effected by destroying the skin by the kali purum. The inflammation that follows the application of caustic is seldom considerable. It, therefore, is the best method of discharging chalk. On many occasions the argentum nitratum is sufficiently powerful. After an opening is

formed, the sore is to be treated as has been already explained.

These observations are not intended as a full account of all that may be done in chalky tumors, or in ulcers arising from them, as the common rules of surgery are often applicable to such cases. I have principally taken notice of the peculiarities, which demand a deviation from those rules. It may, however, be collected from these remarks, that we are quite unable to remedy many of the evils caused by chalk. When this substance is thrown into a joint, its motion is either embarrassed, or entirely lost; when it is poured into the sheath of a tendon, the movement is obstructed, and the muscle to which it belongs is rendered useless. And when it bursts externally, ulcers of long, or endless duration, are the consequence.

These irremeable disasters ought to be represented to those who are subject to gout, to induce them to submit to such restrictions in diet, and to adopt those healthful exercises, which the experience of ages have ascertained, to be the only effectual remedies for extinguishing this deplorable malady.

The proof of this does not rest upon the delusive testimony, or oaths of even respectable and disinterested men, a species of proof which is scoffed at by all who comprehend the subject, as it is found that the attestations are strongest, and the affidavits

most numerous in favour of a medical fact, just in proportion as the fact is doubtful, or false; and that the number of specifics, and the evidence in favour of them, multiply exactly in proportion to the incurableness of the disease.

To illustrate this, take common inflammation; to lessen this affection, there are a few well known remedies: while for scrophulous inflammation, which is much less tractable, the number of boasted remedies is far greater; but for gouty and cancerous inflammation, the infallible specifics are innumerable.

Time alone establishes truth in medicine. A real discovery needs not the aid of oaths, nor the zealous testimony of the grateful. By not trusting to this, the over-officious perjure themselves with good faith, to the infinite detriment of their fellow-sufferers, whom they wish to relieve. No man takes the trouble to swear, that he never saw a chalk-stone in the feet of a seaman, a soldier, or a common labourer. Nor are there any affidavits annexed to cases where abstaining from fermenting drinks, abandoning animal food, and employing daily great bodily exercise, restored martyrs to the gout, to health and strength.

Such cases have occurred in all countries, and in all ages, since medical records were kept; and are authenticated by proofs far superior to the oaths of

the patient and his sympathising friends. No credit should be given to the ignorant.

But who can benefit by such examples? So strict a regimen can only be adopted by those who are reduced to it by necessity; or by the few who are capable of relinquishing present gratifications, to escape future torture.

A CASE

OF

ARTIFICIAL DILATATION

OF

THE FEMALE URETHRA, &c. &c.

BY H. L. THOMAS, ESQ. F. R. S.

Read May 13, 1807.

SUNDAY, April 26th, I was called into the country to see a lady, thirty-four years of age, and the mother of several children. On the morning of that day she had, without any assignable cause, laboured under a suppression of urine; as there was no regular assistance at hand, the husband (whose readings on this subject had been pretty extensive), took upon himself to afford her relief. With this view he introduced an ivory ear-picker into the meatus urinarius, and the water immediately flowed, but as the quantity evacuated did not quite equal his expectations, the instrument was introduced a second time, when it escaped from his fingers, and suddenly slipt, as he expressed it, with a "jerk into the body."

When I saw her, six hours after, she was free from pain, and with no other unpleasant symptom than those which might be expected from the agitated state of her mind. Upon introducing the sound the extraneous substance was readily detected, and was as easily laid hold of by a pair of fine polypus forceps, but I found every attempt to extract it was attended with considerable pain, and followed by a slight discharge of blood, appearances which gave me reason to imagine that the instrument lay across the bladder, with its pointed extremities entangled between the fasciculi of muscular fibres, and that much mischief might be produced by any farther attempts at extraction. I therefore merely ordered an enema to be administered, and directed her to drink plentifully of diluting mucilaginous liquids; I also gave some directions respecting the position of the body at the time of evacuating the urine, which were to be such as to render the orifice of the bladder the most depending part.

On the Monday at two o'clock, I found that she had passed a restless night, and was much indisposed; pulse frequent, face flushed, and the tongue furred; a slight degree of tenderness was beginning to pervade the whole of the hypogastric region. This situation of the patient clearly pointed out the propriety of a speedy removal of the cause of irritation; and as I came provided with the bistoire cachée, I proposed opening into the bladder immediately; this proposition was, however, absolutely rejected by the husband, from

the knowledge he had of a case of lithotomy in a female, who ever afterwards suffered from an incontinency of urine.

With some hesitation, and I must confess with little prospect of success, I introduced a piece of sponge tent into the urethra, three inches long, and somewhat thicker than the full sized female sound, leaving directions for its removal at the end of two hours, or even sooner, if attended with much pain or distress. I took care to prevent the possibility of the sponge separating, and any part escaping into the bladder, by passing a strong string through its whole length secured at both extremities by a double knot.

In the evening I was informed that she had borne the tent for two hours, without any great degree of irritation taking place, and that during the whole time the urine gradually escaped. I sent another piece of the tent somewhat larger than the first, desiring it to be introduced at twelve o'clock the following morning, and allowed to remain in the urethra until I came to her at two. On my arrival I found her tolerably well, and upon withdrawing the tent I passed the fore finger of my left hand into the bladder, where I felt the ear-picker lying across the cervix. At first I conceived it impossible, without laceration, to disengage it from the position in which it appeared so firmly fixed, but by turning my hand, and insinuating the point of the fore-finger

underneath, and towards the blunt extremity, it was readily dislodged, and escaped through the urethra, by the side of my finger. It measured three inches in length, one end being considerably more pointed than the other. I kept my finger engaged in the bladder for (I should guess) five minutes after the expulsion of the ear-picker, solely with a view of attending to the contractile force of that viscus. The sensations I experienced did not in any way accord with the ideas I had formed, for instead of my finger being firmly compressed, as I expected, by the sphincter muscle and bladder generally, I found every where nothing else than a soft pulpy yielding substance, totally insensible to any stimulus I could produce by the finger nail; this inability to contract, may perhaps be accounted for by the partial distension of the bladder for so long a time by the ear-picker. The same agent, however, cannot be assigned as the cause of the general relaxation which had taken place in the urethra, and which was so very complete, that before I withdrew my finger, I believe, had the case required it, both thumb and finger would have passed into the bladder without the smallest difficulty.

On the following day the patient was so well as to preclude even an excuse for any farther examination of the parts; but I was given to understand that the involuntary discharge of urine continued only six hours, and that now she possessed the full powers of expelling it without any other inconveniency than a

slight degree of scalding in its passage along the urethra.

My view in laying this case before the Society is to shew how readily, and with what little pain the female urethra will admit of dilatation. There is no novelty in the mode of accomplishing the object of distension. Near a century back it was proposed by Douglas; he not only recommended sponge for this purpose, but also dried gentian root, as being more gradual in its expansion, and better fitted for the purpose.

Mr. Bloomfield has given the case of a young girl where he effected the dilatation by introducing the cœcum of a small animal, in a collapsed state, into the bladder, filling it afterwards with warm water, by means of a syringe. This was gradually withdrawn as the cervix vesicæ opened, and in a few hours the dilatation was so far accomplished as to allow the calculus to pass through.

Why some of these methods have not been more generally adopted I cannot say, perhaps the incontinency of urine which occasionally has been observed to succeed to great distension of the urethra is the reason of their having been laid aside; with what propriety, however, may be questioned, for I believe it will be found that this unpleasant symptom as frequently occurs after the operation of lithotomy, as it is now usually performed.

We have many well authenticated cases on record where calculi, of a size larger than a hen's egg, have been expelled from the bladder by the expulsive efforts of its own muscles. Heister has related from good authority several instances of the kind, a very remarkable case is also given by Dr. Molineux, in the early part of the Philosophical Transactions, where a stone was voided by a woman, "the circum-" ference of which measured the longest way $7\frac{6}{16}$ " inches, and round about where it was thickest $5\frac{3}{4}$ " inches, its weight near $2\frac{1}{2}$ ounces troy."

If these relations can be credited, and there is no reason why they should not, I can hardly conceive any case in a young and healthy female subject, and where the bladder is free from disease, why a very large stone may not be extracted without the use of any other instrument than the forceps, the urethra having first been sufficiently dilated by means of the sponge tents; for this purpose the blades of the forceps need not be so thick and strong as those commonly employed.

It may be often observed, that muscular fibres, when once stretched to a certain extent, (i. e.) beyond their capability of immediately re-acting, will admit of very considerable elongation without tearing, and yet shall, when the cause is removed perfectly and very speedily recover their original powers. When the luxation of the femur takes place downwards, we observe the great gluteus muscle up-

on the stretch, almost to breaking, before the reduction can be accomplished the fibres will be still farther elongated, yet after this violence of extension, laceration of the fibres hardly ever happens, and when the muscles are again restored to their former situation, their functions become as perfect in a few days as if no injury had been sustained. That sphincter muscles are possessed of similar powers, the above case will, I think, in great measure prove, in addition to which I beg leave to subjoin the following.

A gentleman of an inactive and sedentary disposition had for many years suffered from constipated bowels, which increased to that degree that the most active cathartics failed in producing the desired effect. By the advice of a practitioner, whom he consulted in Paris, he daily introduced into the rectum a piece of flexible cane (about a finger's thickness), where it was allowed to remain until the desire for evacuating the fæces came on. This plan succeeded so well that for more than a twelve month he never had occasion to resort to any other means. One morning, being anxious to fulfil a particular engagement in good time, in his hurry he passed the stick farther up, and with less caution than usual, when it was suddenly sucked up into the body, beyond the reach of his fingers. This accident, however, did not interrupt the free discharge of the fæces, and the same evacuation regularly took place

every day, whilst the stick remained in the gut. It was seven days afterwards when I first saw him; he was in a very distressed state, with every symptom of fever, tension of the abdomen, and a countenance expressive of the greatest anxiety. His relatives and friends were totally ignorant of the real nature of his case; and nothing less than the urgency of his sufferings, could ever have prevailed upon him to disclose it to me. Such were his feelings on the occasion, that a violent hysteric fit was brought on by the mere recital of what he termed his folly.

Upon examination with my finger, per anum, no part of the cane could be discovered; but one end of it was readily felt projecting (as it were) through the parietes of the abdomen, midway between the ilium and the umbilicus on the right side. The slightest pressure upon this part gave him exquisite pain.

After repeated trials I was at length enabled, with a bougie to feel one extremity of the stick lodged high up in the rectum; but without being able to lay hold of it with the stone forceps. To allay the irritation for the present, an emollient clyster, with tinct. opii. ʒ ij, was given, which passed without the least impediment, and did not return. On the next examination, two hours after, I found the sphincter ani considerably dilated, and by a continued perseverance to increase it, the relaxation became so complete, that in about twenty minutes I was en-

abled to introduce one finger after the other, until the whole hand was engaged in the rectum.

I found the end of the stick jammed in the hollow of the sacrum, but by bending the body forward it was readily disengaged, and extracted. Its length was nine inches and a half, with one extremity very ragged and uneven.

For several days after, the situation of the patient was highly critical, the local injury, joined to the perturbation of his mind, brought on symptoms truly alarming. At length I had the satisfaction to witness his complete recovery; and he has ever since (more than two years ago) enjoyed good health, and the regular action of the bowels, without the assistance of medicines, or any other aid.

A CASE

OF

HYDROPHOBIA;

WITH

AN ACCOUNT

OF

THE APPEARANCES AFTER DEATH.

COMMUNICATED

BY ALEXANDER MARCET, M. D. F. R. S.

ONE OF THE PHYSICIANS TO GUY'S HOSPITAL.

Read May, 1807.

IN offering to the Society a case of hydrophobia, I am aware that similar narratives, uncommon as the disease may comparatively be, are not unfrequently to be found in medical writings. The pathology of this malady however, still continues enveloped in the greatest obscurity, and it is only by multiplying observations, and by diligently collecting descriptions of the disease, that we can hope to throw some light on its nature. If, therefore, on comparing the account which I am about to give,

with those of former observers, occasional repetitions or redundances may be remarked, it should not be forgotten that in an inquiry of this kind it is only by comparing various cases of the same disease, and by noticing their similarities, as well as their discordances, that we can expect to succeed in selecting and pointing out those diagnostic symptoms which characterise that disorder.

The opportunity which was afforded in the present instance, of inspecting the body after death, and the full, though unsuccessful trial, which was made of some powerful medicines, were additional inducements, without which I should not probably have presumed to offer this case for publication: and if it should be thought too long or too abundant in particulars, I beg it may be remembered that it is from accuracy of detail that an insulated case derives its principal interest, and that circumstantial accounts afford the only reasonable ground for future generalization.

On Thursday, the 30th of April, 1807, Mr. Astley Cooper informed me that he had just been introduced by Mr. Weston, surgeon and apothecary, in Shoreditch, to a man, 28 years of age,* who appeared to labour under hydrophobia; and thinking that I might be desirous to see an instance of this

* Emanuel Odell, printing-type maker, Suzannah-street, Curtain-road.

rare and formidable disease, was so obliging as to propose that I should attend this patient with Mr. Weston and himself.

Accordingly, on the same day, I accompanied these gentlemen to the house of this unfortunate young man. But before I enter upon the history of the case, I think it necessary to premise, that although I have undertaken to draw it up, both the gentlemen just mentioned have greatly contributed to collect the materials; and that Mr. Weston in particular, watched over this poor man during his illness with such a degree of kindness and assiduity, and recorded his very words and expressions with so much care and accuracy, that if this communication be thought worthy of attention, he has undoubtedly a principal claim to the acknowledgements of the Society.

On our first entering the room we found this man sitting by the fire-side, with the eyes glassy, the pupils dilated, the countenance sallow and dejected, and a peculiar timid look. He received us with a kind of studied civility, through which it was easy to discover a mixture of fear and distrust. On being desired to relate to me the circumstances of his illness, he stated them in a very consistent and clear manner; and from his own narrative, together with Mr. Weston's account of the case previous to my first visit, I collected the following particulars.

First Day.—On Monday the 27th of April, after returning from his work, he complained to his wife of a pain, or rather a sensation of heat in the back of his hand, as if the part had been scorched by the sun. Towards evening this pain crept up along the outside of the arm, following the course of the radial nerve, and then shooting up to the scapula, without in the least affecting the axilla. His general health did not as yet appear materially impaired.

Second Day.—On Tuesday, the 28th, he went to work as usual, complaining only of the pain in his arm; but finding this pain troublesome, and feeling himself seized with a sense of general uneasiness, he left his work in the forenoon and went with some of his shopmates to the public-house, where he got intoxicated. Early in the evening however, he ate his supper, and went to bed as usual. He slept well, having awoke only once in the night, and drank a glass of water. He had been costive two days.

Third Day.—On Wednesday, the 29th, he kept his bed later than usual, and felt restless and uncomfortable. He complained of alternate chills and flushes. At about twelve o'clock, he asked for his breakfast, which was put before him. But on attempting to swallow, he found himself unable to do it, owing, as he said, to a *violent catching in his breath* which took place whenever he renewed the attempt. This day passed without his taking either food or drink. The nature of his disorder being

not yet suspected by his friends, they applied a blister to the nape of his neck. During the night he often tried to sleep; but every time he did this, he was almost instantly awakened by frightful dreams, which occasioned a sense of suffocation, followed by a paroxysm of convulsive breathing.

Fourth Day.—On Thursday, the 30th, he was much worse, the convulsive paroxysms of the organs of respiration being more frequent and violent, and being brought on not only by any actual attempt to eat or drink, but likewise by the mere idea of it. From Mr. Weston's first visit the nature of the disease did not appear to him to admit of doubt; yet from motives of humanity he studiously avoided directing the attention of the patient to the true cause of his disorder. It was not until this day that by some collateral questions respecting the peculiar sensation in the back of his hand, he was led to relate, that about two months before the beginning of his illness, (the precise day could not be ascertained) he was slightly bitten in the fore-finger of his left hand by a little dog, which he was attempting to set on to bait a badger. The bite however, had immediately healed so as to leave only a small scar, which was now scarcely discernible. He mentioned this circumstance with apparent indifference, and without expressing the least suspicion that it could have any connection with his present illness. Upon further inquiry however, it appeared that this dog had also

bitten on the same day his master, a Mr. D.*,in both his hands, and had attempted likewise to bite his master's mother, upon which the dog was put out of the house, and was not heard of till some time afterwards, when Mr. D. was told that it lay dead in a ditch in Hackney fields. Mrs. D. moreover stated, that for two days before the dog left home, he did not bark so distinctly as he used to do, and refused to take food.

It was on the Thursday afterooon, just after these circumstances had been made out, that I saw the patient for the first time, and found him in the state which I have described. At this period, which, if the dread of swallowing be considered as the characteristic of the disease, might be reckoned the third day of his disorder, he complained of no pain except of that in his shoulder; but said he felt uneasy sensations all over his body, attended with thirst and frequent rigors. He repeatedly observed, that all his complaint was in his throat, and that he was choaked whenever he attempted to swallow. On our proposing to him to drink, he started up and recovered his breath by a deep convulsive inspiration; yet he expressed much regret that he could not drink, as he conceived it would give him great relief, his mouth being extremely parched and clammy. On

* Mr. D. did not use any precautions whatever to prevent the effects of this accident, and yet to this moment (November, 1807,) he has not felt any inconvenience whatever from it.

being urged to try however, he took a cup of water in one hand and a tea-spoon in the other. The thought of drinking out of the cup appeared to him intolerable; but he seemed determined to drink with the spoon. With an expression of terror, yet with great resolution, he filled the spoon and proceeded to carry it to his lips; but before it reached his mouth, his courage forsook him, and he was forced to desist. He repeatedly renewed the attempt, but with no more success. His arm became rigid and immoveable whenever he tried to raise it towards his mouth, and he struggled in vain against this spasmodic resistance. At last shutting his eyes, and with a kind of convulsive effort, he suddenly threw into his mouth a few drops of the fluid, which he actually swallowed. But at the same instant he jumped up from his chair and flew to the end of the room, panting for breath, and in a state of indescribable terror. In a few minutes, however, he repeated the experiment with less horror, but with considerable difficulty. Emboldened by these trials and by our encouragement, he soon attempted to suck a piece of orange, and this he did two or three times, though not without great effort and struggling. I asked to inspect his throat and he seemed anxious to comply with my wish, though he evidently dreaded the attempt. He opened his mouth, but as soon as he perceived the spoon with which I was going to press his tongue down in order to have a sight of his throat, he eagerly seized my hand, and begged of me to desist. Mr. Weston, however, was more successful, and gave

us for an instant a view of the patient's throat, which we thought exhibited a slight appearance of redness and swelling; but scarcely two or three seconds elapsed before he jumped up and a fit of spasm came on. We observed that he often tried to swallow his saliva, and that each attempt brought on a spasm in his breathing. This however, he said, he was obliged to do in order to moisten his throat, which was extremely parched. The mere act of blowing his nose occasioned great agitation. His wife having poured out in his presence some drink for the child, he did not seem to be at all affected by it; but on Mr. Cooper unexpectedly sprinkling a few drops of water on his hands, he started up and was seized with one of his fits of suffocation. We persuaded him to wash his hands, which he did with great resolution and with but little reluctance. The first sensation he expressed in dipping his hands resembled much that which is experienced in going into a cold bath, that is a sudden and deep inspiration, followed by a momentary suspension of breathing. But he soon became used to it, and said it was grateful to him. He also suffered his face to be washed, and rather appeared to like this operation after the first sensation was over. We tried the same experiments with warm water, which occasioned similar effects, though in a less degree.

The pulse was at 76 and feeble, whilst the patient was quiet and composed; but it was considerably accelerated during the fits of agitation. We exa-

mined the hand in which he was bitten, but could not discover the least vestige of inflammation, and indeed the scar itself was scarcely perceptible. We agreed that he should have four leeches applied to his throat, and that a bolus, consisting of three grains of pure opium, to which, at Mr. Weston's suggestion, an equal quantity of vitriolated iron was added, should be administered every hour, or at least as often as he could be prevailed upon to swallow the bolus. We were well aware in prescribing opium, that this remedy had been tried to a very considerable extent in a number of instances, without success: but we were in hopes that by administering opium in large doses, we might, if not procure sleep, at least, perhaps, allay the irritability of our patient, sufficiently to enable us to try other remedies.

At ten o'clock at night, we found the patient somewhat more composed. He had taken two of the doses, making six grains of pure opium, and the leeches had bled freely. To the latter circumstance he attributed his apparent improvement. He still, however, complained of great thirst and dryness of the mouth, and made frequent and spontaneous efforts to swallow a few drops of fluid, especially mint tea. He expressed great satisfaction whenever he succeded in forcing a little liquid down his throat, and whilst still breathless and exhausted by the effort, he exclaimed, that he would drink a pint if he could. Just before we entered he had felt some inclination to sleep: he had made some urine, but his bowels conti-

nued costive. The pulse when the patient was quiet and undisturbed, was at 84, and regular, though feeble; but it rose to 100, and became irregular upon the slightest agitation, such as that occasioned by our feeling his pulse. He still swallowed his saliva as often as he could, but complained of its being more and more thick and sticky. He never foamed at the mouth. He swallowed his bolus before us with great determination, though not without much pain and difficulty; and we observed that he could swallow a small crumb of bread when dry, better than when wetted.

The bolus was ordered to be continued as before; and to this I proposed to add moderate doses of arsenic, frequently repeated. It struck me that a full trial of this violent remedy, was in a case of this kind perfectly warrantable; and that in the event of a failure (which of course we considered as extremely probable), still it would be of some use to have ascertained, by a decisive trial, the inefficacy of this powerful alterative, so as to lay it aside in future and leave the field open for other experiments. Mr. Cooper and Mr. Weston having expressed their full approbation of this plan, three drops of Fowler's solution were ordered to be taken every other hour in two drachms of peppermint water, with half a drachm of syrup.

Fourth Day.—Friday, first of May. When we called at eight o'clock in the morning, our patient had just risen. His eyes appeared more glassy, and

the form of a bolus as often as he could be prevailed upon to swallow it.

At four o'clock, p. m. we found him much in the same state, though less under the influence of opium than he was in the morning. He had taken twenty-five drops of the arsenical solution since our last visit, and felt no inconvenience from it. His pulse fluctuated between 104 and 112, and the difficulty of swallowing was not increased. He still suffered his head and face to be washed, and was even observed to smile at his children whilst playing with water, and splashing it about very near the place where he sat.

At ten o'clock at night we found he had lost all inclination to sleep, and had become much more irritable. When we came into the room he appeared suspicious, and even expressed a sort of dread of us, as if expecting that something particular was to be done. He soon however, became reconciled to our presence, and began to converse with us. We observed that in talking he rolled his head round and round in a peculiar manner, and stammered as if he had been intoxicated; but his expressions were perfectly distinct and proper. The cat passing and repassing under his chair, made him start up and rebuke the animal peevishly; but he immediately apologized for being *so fractious.* Being questioned as to the impression which our first appearance had made upon him, he acknowledged that an idea had

come across his mind that we might perhaps have some *queer instruments* about us, and that some experiment might be tried upon him. But he added, that finding it was not the case, he felt great pleasure in our company. He took his bolus before us with great self-command, but in the act of swallowing he had a convulsive paroxysm, very much resembling those which occur in tetanus, his body being drawn backwards with great violence. He bit his tongue severely during this paroxysm. There was no foaming at the mouth, but he continued to be much annoyed by the viscid saliva before mentioned. We examined again his throat and fauces, and could discover no unnatural appearance. He drank several tea spoonfuls of mint tea, and apparently with much less pain than he had experienced in swallowing the last bolus. On being asked, whether he could gargle, he instantly fell into a violent fit of suffocation, and exclaimed on recovering his breath " not for a million of money!" On perceiving a small insect crawling across the table, he jumped out of his chair, and appeared much agitated. A drop of water being sprinkled on his face unawares, he sprung up with a convulsive start, and then said, in a tone which made us regret that the experiment had been tried, " Indeed, gentlemen, this is not fair!" Immediately after which however, the poor man apologized for his rudeness, and said he was convinced that all we did was for his good. The pulse varied from 104 to 116, and the bowels continued costive. He had taken thirty drops more of the

arsenical solution since the morning, making at least sixty drops in the last twenty-four hours, and he had no pain in his stomach or head, nor any inclination to vomit. He complained a good deal of the pain in his shoulder, and of the peculiar sensation in his urethra, above described.

Fifth Day.—(Saturday, 2d of May.) On the next morning at eight o'clock, we found him much worse. Mr. Newington, surgeon and apothecary, in Bishopsgate-street, who sat up with him the whole night, related, that he had been at times extremely unmanageable. He had occasionally taken the drops, but at other times had obstinately refused them. He had repeatedly been prevailed upon to retire to his bed-room, but had returned to the parlour under an apprehension that it was intended to put him under confinement. At one time he seized a large stick and threatened to strike his attendants; but soon afterwards he apologized for the violence of his conduct. Early in the morning, having at last been prevailed upon to lye down on his bed for a few minutes, he suddenly jumped up nearly suffocated, and ran into the parlour roaring and calling for water in the most violent manner. Some mint tea was given him by his own desire, which he seized with extreme eagerness, and of which he swallowed a few drops with great difficulty. During these paroxysms he was observed to have erections of the penis, and an inclination to void his urine. Towards the morning he began to spit almost inces-

santly, now and then making a great effort to clear his fauces of the viscid saliva, after which he seemed to swallow small quantities of fluid with less pain and agitation. He had taken twenty-five drops of the arsenical solution during the night, making in all eighty-five drops in thirty-six hours, and no symptom had occurred which could be referred to this medicine. It had been, however, discontinued from five o'clock in the morning, no advantage having been perceived from it, and we thought it adviseable to lay it aside altogether.

When we entered the room he appeared much agitated. "Oh, do something for me," cried he, "I would suffer myself to be cut to pieces! I cannot raise the phlegm; it sticks to me like birdlime." He then endeavoured to collect himself and express his feelings; but in vain. At last he exclaimed—"Gentlemen, don't ask me questions—I cannot say more—My feelings cannot be described!" His pulse, at that moment, was as quick as 136, but tolerably strong and regular. He appeared still coherent and distinct in his ideas; but some of his perceptions were considerably disturbed. His sight was not materially impaired, for he could tell what hour it was by looking at the clock: but he often fancied he beheld objects which were not before him. He thought, for instance, that he saw various insects and reptiles crawl about him. "My eye sight is queer," said he, "I think I see strange animals, &c." Once or twice he exclaimed with an

accent of terror,—"Who is pouring cold water down my head?" Yet no one was near him. He was conscious of his extreme irritability, and often prayed to be kept tranquil. This unfortunate man in the height of his distress still apologized for his acts of violence, and declared that he could not conceive what occasioned this extraordinary agitation. His pupils were now remarkably dilated, and his eyes looked particularly wild and glassy. His tongue was of a morbid red colour and dry, and his lips parched. He still, now and then, sipped a few drops of fluid with no more difficulty than on the preceding day. Mr. Cooper having applied his finger to one of his carotids so as to make a gentle pressure upon it, the patient at first did not seem to notice it; but in a few seconds he suddenly jumped up, and burst into a most violent paroxysm of rage. "What have you done to me?" cried he, with an inexpressible look of terror: "Why do you throw cold water down my head?" But he soon perceived his mistake, and begged pardon with great emphasis, for the impropriety of his conduct.

From the first appearance of his symptoms to this day, he had had no passage through his bowels, although a cathartic draught and an enema had been administered. But he had at last, this morning, a dark costive motion. There was no deficiency in the secretion of urine. After desiring the women to go out of the room, he requested us to examine his penis, in which he had uneasy sensations. We

found it inflamed round the orifice of the urethra, from which a few drops of a yellowish fluid had been discharged. He observed that he had had several erections during the night, at the time he was the worst. He now began to suspect that his end was approaching, and often prayed God Almighty to have mercy on him and to release him. Sometimes he consoled his wife, and desired her not to despond. During his more quiet intervals he talked slowly and with some difficulty, but with peculiar emphasis, and with the rotatory motion of his head which I have before described. His memory did not appear to be in the least impaired, although his violence and agitation were rapidly increasing. An enema had been administered, and the introduction of water into the rectum had not, contrary to our expectation, occasioned any particular uneasiness. Having abandoned all our former plan of medicines, we ordered five grains of extractum hyosciami to be taken in a little pepper-mint water, and repeated every hour.

When we called again at four o'clock in the afternoon, we found the house door bolted and the patient's friends appeared at first unwilling to give us admittance. The reason of this was, that after taking the second dose of hyosciamus, our poor patient had suddenly burst into a dreadful paroxysm of rage. He exclaimed, that the medicine burnt him to death, and threw himself on a bason of water out of which he drank about half a pint with undescribable

eagerness. From this moment he had conceived that we meant to poison him, and had expressed the greatest reluctance to our approaching him, all his former efforts of civility and restraint being now changed into the most vociferous abuse.

As the hope of affording relief by any kind of treatment or medicines was now quite vanished, and as our presence could only have had the effect of exasperating the patient, we abstained from shewing ourselves to him; but through the cracks of the door we anxiously watched the close of this melancholy scene. He was lying in bed with his eyes sometimes shut, sometimes open, and rolling in the wildest manner. He was muttering and talking incoherently, though he still at times spoke sensibly. He often cried out, "don't touch me," although no body was near him. Abundant sweats broke out on the whole surface of his body, and he had frequent and copious flows of urine. His breathing was irregular and attended with a degree of stertor. He was often agitated with convulsive motions in different parts of his body, and more especially in his toes. He spat frequently, and complained more and more of the thick saliva. Mr Weston having ventured into the room and felt his pulse, whilst in the state just described, was surprized to find it only at 100, and presently afterwards it fell to 70. His wife and brother told us that he had that day, for the first time, talked of the dog, and connected the circumstance of having been bitten with his present situation. But there was

strong reason to suspect that this idea had been suggested to him by the indiscretion of some of the bystanders, who had long been watching for the symptom of barking, which they confidently expected, and thought at last to have clearly discovered in the peculiar noise which he made in breathing.

In the evening he continued extremely suspicious and irritable. But he appeared more exhausted and had intervals of tolerable stillness, which might have been mistaken for real tranquillity, had he not often been observed to cast his eyes round the room with a peculiar expression of wildness and distrust. He could not bear to be touched, nor even to be looked at, and the idea of poison constantly lurked in his mind. His pulse now varied from 100 to 112, and all the other symptoms continued unabated. Once, after a violent paroxysm, he jumped out of bed, seized a bason of water, and violently splashed it with his own hand all over his face and body, till his shirt was quite wet, after which he threw himself into his bed again.

Sixth Day.—(Sunday, 3d May).—The next morning at eight o'clock, we found him evidently sinking. He had not been out of bed since the preceding day, and his urine was discharged involuntarily. He had this morning a copious black stool. His horror when a stranger approached him was still greater than before, and we continued to observe him only through the cracks of the door. His spitting was almost incessant. He had had no sleep at all du-

ring the night, and had been at times delirious. He had sung songs, and talked of drinking with his friends. Yet he knew all those who were about him, and still spoke with kindness to his wife and children. He had drunk a good deal during the night, but in the morning refused all kinds of liquids, thinking we had put poison into them.

He continued nearly in the same state till about three o'clock in the afternoon, at which time he suddenly became more tractable and conversed for some time with Mr. Weston and another gentleman, who prevailed upon him to swallow a little wine. At this time his extremities became cold, his countenance hippocratic, and his pulse was scarcely perceptible. Yet he was inclined to talk and to relate every circumstance of his case. His saliva now became so thick that he frequently took it out of his mouth with his fingers and threw it on the floor. But he seemed afraid of its falling on any one, and begged his brother to take care. He frequently complained of an offensive smell about him. By this time his abdomen had become tense, swelled and painful, and he desired his brother to look if there was not something tight round his body. He became sick and vomited up the wine he had drunk. An enema was administered and was immediately returned with a quantity of flatus.

He complained much of a burning heat about the præcordia, and still talked of the pain in his shoulder.

His countenance, whilst speaking, often put on a sardonic smile. Between five and six o'clock he expressed some wish of sitting up to tea; but tea being brought to him he shuddered at the sight of it. Once after spitting, he said he thought he saw his saliva burn. Another time he said there was blood in it, and desired Mr. Weston to look at it. His pulse about this time was 132, and extremely small. He now became exceedingly weak and restless, and his dissolution seemed to be fast approaching. At six o'clock he raised himself in his bed apparently much oppressed and striving to vomit, but having failed in the attempt, he fell back on his pillow and suddenly expired.

APPEARANCES AFTER DEATH.

The body was opened the next day by Mr. Henry Cline and Mr. Jones, in the presence of Dr. Yelloly*, Mr. Astley Cooper, Mr. Weston, and myself;

* Dr. Yelloly saw the patient frequently with Mr. Cooper and myself during the course of his illness, and witnessed most of the circumstances related in the case. In the latter stage of the disease, the patient was also seen by Dr. Dennison, Dr Farre, and a few other medical men.

About the middle of December of the present year (1807), I saw at Highgate, with Dr. Yelloly, another case of Hydrophobia, the subject of which was a lad, sixteen years of age,

and Mr. Cooper was so obliging as to draw up the following account of the morbid appearances.

" The abdomen being first opened the intestines were found much inflated; but the external appearance of all the viscera of this cavity was free from inflammation, and unaltered by disease of any kind. Upon opening the stomach however, a slight inflammatory appearance was observed upon its internal surface, occupying a space about the size of the palm of the hand, and extending from the left extremity of that organ to the middle of its posterior surface."

" The pharynx was considerably inflamed behind both the mouth and nose, and in the œsophagus there were several detached spots of inflammation at various distances in the course of its canal."

" The heart and lungs were in a perfectly sound state."

" The vessels on the surface of the brain were turgid with blood. Between the pia mater and tunica arachnoides of the left side there was a slight degree of effusion similar to that which is found in

who had been bitten in the lip by a dog about four weeks before. This patient was under the care of Mr. Scudamore, surgeon, at Highgate. He died on the second day from the first appearance of the disease. The symptoms in this case were in many respects analogous to those just described; but having seen him only once, and having not been able to obtain leave to inspect the body, I do not consider myself as competent to relate the particulars.

cases in which death has been preceded by delirium, but in a less degree. Some of the vessels of the pia mater contained small bubbles of air; but it was doubtful whether this air had not entered the vessels, in consequence of the sawing of the scull."

"The ventricles of the brain did not contain more than the usual quantity of serum, nor were there any other morbid appearances of the brain than those above described."

I do not flatter myself that the history of this case, or the appearances exhibited on dissection, will afford any considerable assistance towards forming general conclusions. Yet I conceive, it may not be altogether unproductive of useful inferences. As my object, however, in drawing up this account, was not to enter into any pathological discussion, but merely, as I stated before, to furnish systematic writers with a few additional and well authenticated facts connected with this extraordinary disease, I shall content myself with pointing out two or three practical inferences which the case appears to suggest. I would observe in particular that the inefficacy of opium which had already been evinced by several cases on record*, was fully confirmed by

* See two cases communicated by Dr. Babington; the one in the first volume of the *Medical Communications*, and the other in the *Medical Records and Researches*, both of which bear, in many particulars, a very striking resemblance to this.

this; and that both iron and arsenic, two medicines to which it was very desirable to give a full trial, are likely to be added to the long list of those from which nothing but disappointment has yet been obtained in this dreadful disorder.

I would also beg leave to point out a circumstance which does not seem to have been sufficiently remarked. I mean the pain which is felt in the parts contiguous to the bitten spot, at the moment the symptoms of hydrophobia are developed. This pain, it would appear, is apt to follow the course of the nerves rather than that of the absorbents. In the present case*, as well as in one of the cases detailed by Dr. Babington, there was pain in the arm and shoulder, but without any affection of the axillary glands; and in another case, published in the second volume of the *Medical Communications*, the pain occasioned by a bite in the leg was referred to the hip and loins, without any affection of the inguinal absorbents. Should this remark appear to have any weight, the consequence which would naturally be drawn from it would be, that when the precaution of removing or cauterizing the part has been neglected in the first instance, it may still be adviseable to have recourse to it at any subsequent period before the developement of the disease.

* We dissected and examined the radial nerve; but, as we fully expected, not the least diseased appearance could be discovered.

AN ACCOUNT

OF

THREE CASES OF SUDDEN DEATH,

WITH

THE APPEARANCES ON DISSECTION,

AND

SOME ADDITIONAL OBSERVATIONS.

BY THOMAS CHEVALIER, ESQ. F. R. S.

SURGEON TO THE WESTMINSTER GENERAL DISPENSARY, AND SURGEON EXTRAORDINARY TO THE PRINCE OF WALES.

Read May 11, 1808.

AT a former meeting of the Society I related the cases of three persons who had died suddenly, and whose bodies I had been called on to examine; and the immediate cause of their death appears to be generally noticed by anatomists, I have great in complying with the request of the Society the circumstances again in this paper.

ed in September, 1806, in Greenwich, who while

talking with her husband complained of being faint, and desired to be laid down. She was led to the bed, and was supposed to fall asleep, as he still continued to support her. In about twenty minutes he rang for the servant, who, on entering the room, exclaimed—"My mistress is dead!" So it unhappily proved; and I was desired on the following day to investigate the cause of this most affecting event.

The head was first opened, and the brain carefully dissected; but not the smallest vestige of disease could be perceived in any part of it.

On examining the trunk of the body, no morbid appearance presented itself in any of the viscera. The uterus was in a state of impregnation, so early, that the fissure in the ovarium, from which the ovum had escaped, was yet distinctly to be seen.

This apparent absence of any disease, led me to pay more particular attention to the state of the heart; on opening which, I was much struck with its extreme flaccidity, and the entire emptiness of all its cavities, in neither of which was the smallest quantity of blood. There was blood however both in the vena cava, and in the pulmonary veins.

I had never, on any former occasion, seen the heart so completely empty. It is not unusual to find the ventricles shut up by muscular contraction, so as nearly to exclude blood from them; but here

both auricles and ventricles were destitute of it, without either of them being in a contracted state.

It therefore appeared to me that this lady had died from a syncope, or rather, asphyxia, of a peculiar kind; in which the action of the heart had ceased for want of the regular supply of blood from the returning vessels.

A few weeks after this occurrence, I was again called to Greenwich, to examine the body of an elderly man, who had recently recovered from a maniacal affection, and who, after falling suddenly from his chair, breathed short for a few minutes, and then expired.

I went to this dissection fully prepossessed with a persuasion that he had died of apoplexy; and I was much surprised, when, on the most careful examination of the brain, I could find no morbid appearance, except an ossification of the falx, which must have been of long duration, and though it might in some degree account for his mania, could not at all account for his death.

I therefore proceeded to examine the body; for immediately the circumstances of the former case occurred to my mind, and also to Mr. Harrison, who had been called to both patients, and was present at the dissections.

The state of the heart was exactly similar. All the cavities were empty, but uncontracted; and the vena cava was also empty to the distance of several inches from the auricle. No other appearance could be detected in any viscus, by which death could at all be accounted for.

The last case occurred lately in a lady who died shortly after having been delivered of twins. I was informed she had for some time entertained apprehensions that she should not survive her delivery. After the birth of the second child she appeared a good deal exhausted, and as the discharge of blood was very moderate, the accoucheur thought it best to defer the extraction of the placenta. She recovered a little; but about two hours afterward grew suddenly faint, breathed short, and died in about half an hour.

In this case I did not examine the head, nothing having existed to excite a suspicion of mischief there. All the viscera were free from disease. The uterus contained the placenta with a small quantity of blood. But all the cavities of the heart were in a state of relaxation and completely destitute of blood. There was no blood in the vena cava near the heart, and the emptiness of its ascending branch extended as low as the iliac veins.

In all these cases the heart itself, and its valves, were free from any disease or alteration of structure.

I have hitherto been able to find only two similar instances recorded by medical writers. One of these is mentioned by Bonetus, Sep. Anat. vol. i. p. 883. A woman, more than forty years of age, complained suddenly of dimness, noise in the ears, and headach. She soon after lost her voice and pulse, and died in four hours from the attack. She had previously laboured under pectoral complaints, and on opening the body, the lungs were found coated with coagulable lymph, and abounding with pus in their substance. But the most remarkable circumstance, and which alone explained the manner of her death, was, that neither in the heart, nor the adjoining vessels, was a drop of blood to be found. " Neque " cor, neque vasa adsita, vel guttam sanguinis con- " tinebant."

The other case is recorded by Morgagni, Epist. 48. Art. 44. and very much corresponds with the third of those I have related above. It was of a woman, who, during her pregnancy, had some presentiment that she should not survive her labour, although she had already been the mother of several children. She was delivered of a daughter; but the placenta did not come away. An hour afterward, she was suddenly seized with dejection of spirits, coldness, and loss of pulse, and died in an hour and an half from the attack. On dissection the heart was exceedingly flaccid; scarcely any blood was found in the auricles or right ventricle, and none at all in the left. " Cor supra quod dici possit flacci-

" dum, nihil fere sanguinis in auriculis, dexteroque ventriculo, nihil autem prorsus in sinistro continebat." The state of the adjoining blood-vessels is not noticed.

The disease I have now described may perhaps be properly termed *asphyxia idiopathica.* The essential circumstances of it evidently denote a sudden loss of power in the vessels, and chiefly in the minuter ones, to propel the blood they have received from the heart. In consequence of which, this organ, after having contracted so as to empty itself, and then dilated again, continues relaxed for want of the return of its accustomed stimulus, and dies in that dilated state.

But it is remarkable that death was not produced instantaneously in either of these cases. So that it is probable the larger veins continued their office a little while after the attack; and that blood flowed from them for a short time, into the heart; feebly indeed, and in small quantity, but still enough to keep up a little action in it. It is also probable that the debilitated state of the extreme vessels, though sudden and great, was not complete at first; especially in the last of the three cases I have related, and in those quoted from Bonetus and Morgagni: but the action of the heart gradually failing for want of supply, that of the larger arteries would soon fail also, for the same reason, and death must then follow of course.

The flaccid state of the heart is probably produced by its own vessels partaking of the general debility, and thus inducing an atonic state of its muscular fibres.

The weakened state of the circulation through the pulmonary vessels will account for the short, or to speak more correctly, the feeble breathing, which commences with the attack, and continues till its termination.

Although I feel quite unable to account satisfactorily for the first production of such a disease, it nevertheless appears to me that these histories lead to some important practical conclusions. Such as have occurred to myself I shall take the liberty to point out. Others may probably be supplied hereafter by practitioners, who, aware of the nature of the disease, and called in immediately on its commencement, will direct their attention to its various circumstances, more particularly than may hitherto have been done.

The impropriety of taking away blood in such a case, is, I think sufficiently evident; nor indeed does it seem likely that an attentive practitioner would confound it with any in which that evacuation is called for. The state of the pulse, and particularly of the respiration, would be a sufficient distinction, and clearly point out the necessity of the most prompt and active measures to stimulate the extreme vessels,

to accelerate the returning blood, and to excite the nervous energy.

It would therefore be proper to lay the patient as speedily as possible in the horizontal posture, and to give internally some highly stimulating liquid; as brandy, wine, æther, volatile alcali, &c. and these should be given in a tepid state, lest their coldness, when first swallowed, should retard their salutary influence on the extreme vessels and nerves of the stomach. Spices may also be employed, and in this, as in many other cases, would probably be borne in larger quantities than are commonly exhibited. A scruple of the Pulvis Aromaticus, for example, may be given for a dose. Brisk friction of the surface of the body, and particularly of the extremities, should be employed, and the patient covered with warm blankets, taking care however, to leave the face open, and on no account to impede the freest possible access of pure air to the lungs. A hot bath might be of use in some instances; and it would probably be more effectual if it were prepared with salt water, or strongly impregnated with some stimulating ingredient, as capsicum, pepper, ginger, &c. But some discretion is certainly requisite in the employment of a hot bath, where great debility prevails, lest the exertion and fatigue attending its use, should increase the irritability in too great a proportion, and exhaust the remaining strength.

A pint or more of camphorated mixture thrown

up warm, as an enema, by means of a syringe, might also be of use. Some æther, or tincture of castor, or assafœtida, might perhaps be added with advantage. But in this, as well as in the employment of the warm bath, care must be taken not to over fatigue the patient; for no debility will be found more insuperable on many occasions, than that arising from fatigue. So that these remedies will perhaps be most useful after something stimulating has been given by the mouth, and is beginning to produce its effect.

Other means may be suggested by the particular circumstances of different cases; and where the nature of the attack is known, one cannot but hope it may in some instances be remedied. It is with this view I have brought the subject before the Society, and I shall feel highly gratified if these imperfect observations should be the means of bringing forward more complete information respecting it, than I have been able to impart.

Some time after I had delivered to the Society an account of the above cases, I was conversing on the subject with my friend Mr. Charles Woodd, of Edgeware Road, who informed me that he had recently met with two cases which appeared to him very extraordinary, and which he could not help considering to be of a similar nature to those I had men-

tioned. When he related them to me, I was entirely of that opinion, and requested he would favour me with an account of them in writing, that I might lay them before the Society. This he has obligingly done, and as both cases terminated favourably, I have no doubt the Society will consider them as a valuable addition to the paper already alluded to.

"CASE 1.—At six in the morning of August 28, 1808, I was desired to visit Mr. A. who had been attacked about one o'clock, with an uneasy sensation in the thorax, difficulty of respiration, and a sense of extreme lassitude. I found him with a pulse hardly perceptible, and not more than twenty-nine in a minute, although the vessels of the skin, and tunica conjunctiva were loaded with blood. Previous to my being sent for, he had taken three large spoonfuls of Reymer's tincture (a very stimulating preparation), and one bottle of a mixture which he generally kept by him, having been subject to spasms, and which contained mist. camph. ʒvj. sp. lav. c. ℥ss. sp. ammon. c. ʒiij. The anxiety still increasing, he took three tea spoonfuls of what appeared to be camphorated liniment, and some brandy. Notwithstanding all this, the action of the heart had decreased. When I saw him, the sense of fainting and difficulty of breathing became almost insupportable. I immediately gave him a tea spoonful of æther vitr. and repeated it every ten minutes, till he had taken an ounce, but without the least effect, either on the pulse or his general feelings. I there-

fore continued to give more stimulants; and by eleven o'clock he had taken, in various preparations, in addition to what has been before mentioned, ammon ppr. ʒss. t. opii. gtt. 40. tinct. castor. ℥ss. ten drops of the medicine called the black-drop; and two drachms of the sp. ammon. comp. with camphor mixture. At twelve, an enema, with sixty drops of tinct. opii, was administered, and two drachms more of æther had been taken. Friction had been used along the spine with æther and volatile spirit, and also over the sternum. The pulse now became more perceptible, and gradually increased in strength till two o'clock, when he went to sleep, but with the breathing still laborious. At four o'clock he awoke; a blister was applied to the sternum, and he took a draught every four hours, composed of gutt. nigr. gtt. v. aq. ammon. acet. ʒij. mist. camph. ℥j. sal. c. cerv. gr. iv.

"On the following day he felt nearly recovered; nor did all this quantity of stimulating medicine produce the slightest degree of fever. He has ever since continued in health."

"Case 2, was much slighter. Mr. W. after a long walk, was suddenly seized with great difficulty of breathing and faintness, so as to be unable to stand, or speak distinctly. He was immediately taken home, and I found his face suffused with blood, his breathing difficult, with great anxiety, and his pulse scarcely perceptible. He imagined

himself dying. I gave him immediately two drachms of sp. ammon. c. and in ten minutes one drachm of æther, and thirty drops of tincture of opium. In about twenty minutes he was relieved. A blister was however, applied to the chest, and in the course of the evening he took a mixture composed of conf. opiat. ʒj. ammon. ppr. ʒss. aq. cinnam. ℥iij. The next morning he was much better, and has ever since continued well."

The latter of these two cases may at first appear only an attack of common asphyxia; but its affinity to the rest is, I think, distinctly marked, by the suffused appearance of the countenance; which evidently shewed the detention of the blood in the extreme vessels. The former case is however, more remarkable; and its favourable termination seems to be principally owing to Mr. Woodd's judicious and persevering exertions.

December 13, 1808.

A

CASE OF INTUS-SUSCEPTIO,

WITH

REMARKS,

BY THOMAS BLIZARD, ESQ. F. R. S.

AND R. S. OF EDINBURGH,

AND SURGEON TO THE LONDON HOSPITAL.

Read Dec. 13, 1808.

HAVING lately had an opportunity of examining the body of a male child, aged five months, who died in consequence of an intus-susception, I take the liberty of transmitting an account of the appearances, with a drawing by Mr. Clift, to the Medical and Chirurgical Society.

Intus-susceptions, to a small extent, are not unfrequently noticed, particularly in children, without any mark of having produced obstruction or inflammation of the alimentary canal; but, as a disease, [illegible]ily, is of rare occurrence. The subject of [illegible] had, previously to the attack, been

always healthy, and free from bowel-complaints. On Sunday, the 28th of February, he was seized with vomiting, accompanied with constipation, and other signs of disordered functions of the bowels. There were, at first, some small discharges of mucus by the anus; but, after Monday, the discharges, which were frequent, were principally of blood. The abdomen was tense, and on the left side, there appeared a tumour, about the size of an egg. A hiccoughing commenced on the Tuesday, and continued until death, which took place on Thursday evening, the fifth day from the accession of complaint.

On dissection it appeared that the tumour on the left side was produced by an intus-susception: about six inches of the intestinum ileum, the cœcum, with its appendix, the ascending colon, and transverse flexure, being contained in the sigmoid flexure of the colon, extending into the rectum. The intus-suscepted parts were in a state of complete strangulation, and perfectly black. The lower part of the ileum (about ten or twelve inches) immediately above the intus-susception was a little inflamed; but, otherwise, the effects of this derangement of parts were so strictly confined to the intus-suscepted bowel, that had the child's constitution been able to sustain its separation, the inflammation necessarily accompanying this process would, no doubt, have produced an union of the ileum with the lower part of the colon; the continuity of the canal would thus have

been maintained, the separated part might have passed, and the child have recovered.

I feel justified in hazarding the opinion of the possibility of the child's doing well under these circumstances from the relation by Dr. Baillie, in the second volume of the transactions of a society for the improvement of medical and chirurgical knowledge, of two cases in which gut was passed per anum.

The one case is that of a lady, about fifty years of age, who, after much suffering with violent pain of the stomach and bowels, more especially on the left side, accompanied with vomiting and constipation, about three weeks before her death, voided above a yard in length of intestine, which proved to be a portion of the colon. It is worthy of remark, that the pain was more especially seated on the left side, and that the evacuations, for many days, consisted merely of blood, and at that time were very numerous. In these respects there is a striking resemblance between this case and the child's just related.

Of the other case there are no further particulars stated, than that the person lived two years after discharging a portion of gut, about six inches long, and which proved also to be a part of the colon.

The learned doctor not having had an opportunity of investigating after death the processes of nature

under these extraordinary circumstances, has proposed an ingenious explanation of the cases by supposing a membrane, formed of coagulable lymph, to have been produced round the mortified portions of intestine, by which a continuity of the canal was maintained. It is with the greatest deference I presume to offer a sentiment contrary to an authority so generally, and justly, respected; but is it not highly probable that these were cases of intus-susceptions, in which the intus-suscepted portions had been strangulated, had died, and were separated?*

It is not very easily to be conceived, how, in the natural state of parts, the peritonæum, which binds down the cœcum and ascending colon, admitted of their being suddenly removed, as in the present case, to the left side into the sigmoid flexure of the colon: it is therefore very probable, that there was some variety in the mode of application of the peritonæum here, and which, if similar to what I once, some years ago,

* I am authorized by Dr. Baillie to say, that for a considerable time past, he has entertained the same ideas on the subject, which I have here stated.

I was not aware, when I wrote this paper, of Dr. Hull's having some years ago, (in the Medical Journal for 1802,) adopted a similar view of the point in question; and of Dr. Baillie's having then, with the most honourable candour, admitted that he was probably mistaken in the reasoning which he had employed with regard to it. I am happy in noticing this coincidence of opinion between Dr. Hull and myself, and in furnishing a case which tends so much to confirm its accuracy.

observed in a subject on which I was demonstrating, would readily permit such a displacement and might strongly predispose to it. The peritonæum was applied in a loose form to the cœcum and ascending colon, being, as it were, a continuation of the mesentery: by which these parts were, in some degree, left loose, and might easily pass over to the left side.

EXPLANATION OF THE DRAWING.

THE sigmoid flexure of the colon, and the rectum, are laid open, by which the incarcerated bowel is exposed.

The division is continued into the intus-suscepted part of the colon, to expose the entrance of the ileum.

The rectum was divided off as low as possible, so that it appears that the intestine was protruded to within an inch and a half, or two inches of the anus.

A

DESCRIPTION OF TWO MUSCLES

SURROUNDING

THE MEMBRANOUS PART OF THE URETHRA.

BY JAMES WILSON, ESQ. F. R. S. &c.

A VICE PRESIDENT OF THIS SOCIETY.

Read Dec. 13, 1808.

THE difficulty occasionally met with in introducing into the bladder either a bougie or catheter, induces me to lay before the Society a description of certain muscular fibres, not generally known, the contraction of which must occasionally prove a very powerful impediment to the entrance of either instrument.

In my lectures on the organs of generation, I have, for these last ten years, demonstrated to the students attending in Great Windmill Street, two very distinct bellies belonging to muscles of a triangu-

lar shape, united below by one common tendon, but each having a separate tendinous attachment to the inside of the symphysis of the pubes, and which are so placed as to surround the membranous part of the urethra. The tendon belonging exclusively to each muscle, is at first of a round shape, but soon becomes flattened as it descends; it is affixed to the back part of the symphysis of the pubes; in the adult, about one-eighth of an inch above the lower edge of the cartilaginous arch of the pubes, and nearly at the same distance below the attachment of the tendon of the bladder; to which, and to the tendon of the corresponding muscle, it is connected by very loose cellular membrane. The tendon descends at first in contact with, and parallel to its fellow; it soon becomes broader, and then sends off fleshy fibres which also increase in breadth, and when near to the upper surface of the membranous part of the urethra, separate from those of the opposite side, spread themselves on the side of the membranous part of the urethra through its whole extent, then fold themselves under it, and meet in a middle tendinous line, with similar fibres of the opposite side. One extremity of this common tendon is connected with the posterior part of the tendon joining the acceleratores urinæ muscles, and which, in the perineum joins also with some of the fibres of the sphincter ani and tranversales perinei muscles.

The line of tendon connecting the two bellies of these muscles, is in general very distinctly seen run-

ning from the apex of the prostate gland, along the under surface of the membranous portion of the urethra, until it enters the corpus spongiosum penis. Sometimes, however, it is more faintly marked, and the fleshy fibres then appear to be continued into each other.

From the attachment and course here described, one action of these muscles must be, to draw the membranous part of the urethra upwards, so as to compress it against the inside of the cartilaginous arch of the pubes. Another action must be, to contract the circle formed by them round the membranous portion, so as to diminish, and even close up that part of the passage for the urine. It is well known that the part where the membranous portion of the urethra joins the penis, is naturally the narrowest part of the canal; it is at this part, that the chief impediment is felt, in irritable urethræ, to the introduction of any instrument; and here strictures generally begin to be formed. The contraction of these muscular fibres must occasionally increase the difficulty, and sometimes of itself produce it. When bougies have been introduced into very irritable urethræ, and have been permitted to remain in them a few minutes, I have often observed, on their being withdrawn, that they were much flattened at that part which lay in the membranous portion of the urethra. This could only be occasioned by the muscles, which in the perineum are connected with the middle tendon of the muscles now described, con-

tracting at the same time, rendering the perineum a fixed point, and thereby obliging the fibres of the muscles surrounding the urethra, to form in their contraction a straighter line, and thus to compress the sides of the urethra more than the under part, and by this means to change the urethra from a circular to an elliptical form.

I have lately looked into the account which Winslow (the most accurate anatomist I know of, as far as he has written) gives of the muscles of these parts, and find he has some, not very intelligible descriptions, of small muscles which have not been mentioned by other authors; but none of them apply at all to those now described by me. My predecessor, in the Anatomical Lectures, Dr. Baillie, always demonstrated circular fleshy fibres surrounding the membranous part of the urethra, but he had not traced their attachment to the pubes, so as to consider them as forming distinct muscles. The fleshy fibres which spread over part of the prostate gland, from the tendon of the bladder, are very different from these. The cause of these muscles having been so long overlooked, has arisen, I believe, from their being in the neighbourhood, and having their fibres running something in the direction of those of the levatores ani; from which, however, they may be distinctly separated, by cutting through cellular membrane only. By attention to the following circumstance, any one who has not before searched for them may readily find them. There are some small veins

which always run from the sides of the bladder and prostate gland, forwards, to join those into which the vena magna dorsalis penis separates, below the arch of the pubes, and which are continued to join the internal iliac veins of each side. These veins invariably pass in the space between these muscles of the urethra, and the anterior edges of the levatores ani. Sometimes indeed, below the passage of these veins, I have found a little blending of the fibres of the two muscles, but never more than is often found between muscles contiguous to each other, and which always have been described as separate ones; indeed I have so frequently dissected them, that I find no more difficulty in exposing them, than I do in exposing any other muscles*.

Knowing that such muscles exist, we shall not hastily infer, that a permanent stricture of the urethra is formed, because we cannot immediately introduce a bougie or catheter. We shall therefore avoid using those remedies, which, though adapted to the cure of a stricture attended with a morbid alteration of the urinary passage, would, in a case arising from contraction only of these muscles, prove injurious to our patient. In cases of retention of urine, where no instrument will enter the bladder,

* In the female, muscles are also found having exactly similar attachments to the pubes as these described in the male, they descend and separate on the urethra, and I have more than once traced them round it. They are situated between the levatores ani and sphincteres vaginæ.

we shall be induced to persevere in the means best adapted to overcome a temporary, but forcible contraction of muscles, which are constant, but which are seldom thrown into such strong action. When this has been done, our second attempt to draw off the urine will probably succeed. It is my wish here, however, to point out an arrangement of muscular fibres till now overlooked, not to reason on such arrangement.

I have had several drawings taken by different gentlemen from the side views of the pelvis, made for the lectures, in different years. A copy of one made in 1804, by Mr. Cliff, whose accuracy in delineating anatomical subjects is well known, accompanies this description. These muscles are seen of the size they are always found to be, as relative to the other parts.

Explanation of the Plate at page 180.

A. The symphysis of the os pubis.
B. The penis, having a staff introduced along the urethra into the bladder.
C. The left crus of the penis detached from its bony connection, and turned to one side.
D. The corpus spongiosum and bulb of the urethra.
E. The tendinous attachment of the bladder.
F. The prostate gland.
G. The muscle described in the paper, which surrounds and attaches the membranous part of the urethra to the symphysis of the pubes. The dark lines behind this muscle represent the edge of the levator ani muscle of the right side.
H. The bladder.
I. The vesicula seminalis.
K. The rectum.
L. The peritoneum, reflected from the rectum to the bladder.
M. The sacrum, where it forms the joint with the ileum.
N. The sphincter ani muscle.
O. The transversalis perinei muscle detached from the ischium, and turned to one side.

P. The accelerator urinæ muscle detached from the side of the urethra.

Q. The testicle.

R. The vas deferens.

S. The ureter.

A CASE

OF

TUMOUR IN THE BRAIN,

WITH

REMARKS ON THE PROPAGATION OF NERVOUS INFLUENCE.

BY JOHN YELLOLY, M. D.

PHYSICIAN TO THE LONDON HOSPITAL.

Read Nov. 29, 1808.

THE following case I take the liberty of communicating to the Society, principally on account of some of the circumstances attending it, being connected with a very obscure fact in the pathology of the brain, viz. that of compression in one side of that organ, producing paralysis in the opposite side of the body.

David Thomas, a man of a fair complexion, and of about thirty-six years of age, became my patient in the General Dispensary in December 1806, on account of a slight paralysis of the right side, and a distortion of the left eye. He had been subject, for

twelve months before, to occasional severe attacks of pain of the head, shooting from behind forwards; and about six weeks previous to my seeing him, he was surprised, on awaking in the morning, to find his left eye drawn inwards, and his vision double. In two or three days more, his right hand became weak; and this was gradually followed by weakness, and afterwards by numbness of the corresponding leg and side; and by a slight stammering, and a small degree of distortion of the mouth.

These symptoms continued when I first saw him, with some degree of head-ache, and his pulse about sixty-eight, and rather weaker in the affected than the sound arm. In other respects he was in his accustomed state of health. The left eye was drawn towards the nose, but the pupil was in its usual state of sensibility to light. The double vision continued. All voluntary power over the abductor muscle was lost; nor did the affected eye, as in common cases of strabismus, recover its usual position on shutting the sound one. He had been purged and blistered by a gentleman well versed in the treatment of complaints of the eye, when the distortion first came on; but he ceased to be under his care on the paralysis supervening.

In little more than a week from the time of my first seeing him, he became at first slightly, and then considerably affected with convulsive motions of the whole body. These recurred at more and more

frequent intervals, he became gradually less and less sensible, and died in about twenty-four hours from their commencement. I saw him a few hours previous to his death. He was then in a state of insensibility, with his eyes suffused, his pulse weak, frequent, and fluttering, and his respiration laborious. The distorted eye had recovered its usual position a few hours before, and the pupils were insensible to the action of light.

On dissection, the brain was found to be of an unusually firm texture, with about half an ounce of water in the ventricles. There was no diseased appearance in the right side of the head, but in the left, a tumour was discovered on the tuberculum annulare, which my friend and colleague Mr. Thomas Blizard, surgeon to the London Hospital, did me the favour to examine with me. 'It was about the size of a hazel nut, and was lying on, and sunk into the tuberculum, at its posterior part, on the left side. It extended to the corpus pyramidale of the same side, pressing upon, and entirely obscuring the left abductor nerve. The tumour was closely connected with the basilar artery, half an inch from the union of the vertebrals to form it; and the coats of this artery had become so tender, that they readily gave way from the application of a probe, which passed through the tumour. The tumour was in a state of imperfect suppuration, and a small coagulum was formed on the diseased point of the artery, similar to what is found in aneurismal arteries.'

The tumour now described, agreed very much in nature with those, which various authors on the subject of morbid anatomy have mentioned, as being occasionally found in the brain. It seemed to be of a scrophulous nature, and its appearance and imperfect suppuration were analogous to those of scrophulous tumours, formed on the surface, or in any of the cavities of the body. The pressure which it made on the tuberculum annulare and medulla oblongata, there appears to be no doubt, gave rise to the pain of the head, the strabismus, the gradual production of paralysis, and the convulsions which occurred in the latter period of the patient's life. The distortion of the left eye towards the nose, was the necessary consequence of the nerve being affected which gave energy to the abductor muscle of the eye; and as it arose from the preponderating influence of its antagonist, the adductor, it went off at that period, near the close of life, when the whole nervous system became in a great degree inert.

The pressure which was made on the basilar artery, had produced a considerable thinness and tenderness in its coats, so as to make them readily give way, on the application of a probe. Had this gone on a little further, the patient must have lost his life by the vessel giving way, from its inability to resist the pressure of the column of blood which passed through it.

With regard to the treatment of this complaint, I

had directed a blister to be applied and kept open in the neighbourhood of the head, and a gentle mercurial course to be commenced; but the short period of the patient's life under this plan, rendered it impossible to form any opinion of its probable efficacy.

I am inclined to think, that in such cases, mercury affords the best prospect of advantage, both from its good effects in obstinate head-aches, not connected with venereal infection, and from the advantage arising from its exhibition in mesenteric obstructions.

The paralysis which took place in the present instance, afforded an example of compression in one side of the encephalon, producing a diminution of voluntary power over the opposite side of the body; and the particular local situation, and precise effects of the pressure, were more distinctly marked than generally happens in paralytic affections. The consideration of the circumstances of this case, and the difficulty of obtaining any precise and consistent details concerning this curious phenomenon, have induced me to think, that it may not be altogether useless to inquire, what are the particular parts to which it applies, and whether we are in possession of any facts, which will enable us to form a rational conclusion concerning its mode of production.

The nerves which supply that part of the body which is affected in hemiplegia, are, with very few exceptions, derived from the medulla oblongata, and

its continuation the spinal marrow. It is proper therefore to consider, in what manner these substances are connected with the other parts of the encephalon. The medulla oblongata assumes, at its upper part, a bulb-like form; and it is there united to the tuberculum annulare, or, as it it is also termed, the pons varolii. This last is formed by the union of the crura of the cerebrum and the cerebellum; and it is the only channel of communication between these substances and the spinal marrow.

But as the tuberculum annulare, and the medulla oblongata and spinalis, are the only media by which the united influence of the cerebrum and cerebellum can be propagated to the nerves which derive their origin from the spinal marrow, and which are therefore principally affected in the production of hemiplegia, I shall consider, whether there is reason to suppose, that nervous energy, in whatever that may consist, is in its progress to the spinal nerves, confined to the particular side from which those nerves proceed; whether it is subject to any decussation; or whether it is equally dependent, for its propagation, on the whole spinal column.

The structure of the spinal marrow, and the effects of compression or other injuries on particular portions of it, are subjects intimately connected with these inquiries, but concerning which anatomists are very discordant, and some of them not altogether consistent.

HALLER describes it as consisting of two columns a right and left, principally made up of medullary substance, and separated, both in the anterior and posterior parts, by a furrow. He has not observed any fibrous appearance in the course of it; but in the medulla oblongata he remarks, that on separating the furrow which divides the corpora pyramidalia, some transverse medullary fibres present themselves, which he never observed to decussate.

With regard to the effects of pressure, or other injuries on the medulla spinalis, he informs us, that that side of the body becomes paralytic, in which the spinal marrow had suffered a wound or pressure;* but at the same time, in another part of his work, he states, that if one half of the medulla spinalis is divided, the muscles of the opposite side are paralized†. From hence it is evident, that Haller did not, in this particular instance, speak from his own observation.

* In medulla spinali, nihil simile locum habet, & id latus corporis resolvitur, in quo, ea medulla vulnus passa est aut pressionem.

Haller's Elementa Physiologiæ, tom. 4, p. 334.

† Alterius demum lateris, musculi resolvuntur, si dimidiam medullæ spinalis dissecueris.

Haller's Elementa, tom. 4, p. 326.

Si minus malum fuerit in medulla spinali, perinde etiam, aut non penitus motus artuum inhibetur, debilitatur tamen, aut alterius lateris musculi resolvuntur.

Haller's Elementa, tom. 4, p. 327.

SŒMMERING also divides the medulla spinalis into two lateral columns, each of which, however, he considers as being composed of an anterior and posterior one. He has not noticed any medullary fibres in its progress, but with Haller, he describes an appearance of medullary fibres in the medulla oblongata, which, he informs us, begin to decussate immediately below the ninth or lingual nerves*. Of the phænomena produced by injuries on the spinal marrow, he says, that the same side of the body is generally affected, as that in which the injury is sustained;† but this is difficultly reconcileable to another passage, in which he gives it as his opinion, "that it is highly probable, that the fibrils of the spinal nerves, every where belong to the opposite side of the body to that in which they are dispersed"‡.

* Mox infra nervi lingualis medii originem, fibræ medullæ mutuo se secare incipiunt, facileque id leniter utraque parte medullæ spinæ & dextra et sinistra, a se invicem distracta, observari potest.

Sœmmering de Corporis Humani Fabrica, tom. 4. p. 78.

† Læsa vero spinæ medulla latere, plerumque idem corporis latus adficitur.

Sœmmering, tom. 4, p. 87.

‡ Quod cerebri nervos attinet, ad oculos id quidem demonstrari nequit, veruntamen, quod spinæ medullæ fasciculi inter se implicantur, fila nervi medullæ spinæ ad latus oppositum ei in quo sparguntur, passim pertinere, verosimile videtur.

Sœmmering, tom. 4, p. 121.

That this is not an unusual idea, appears from the following quotation from Bichat. Ils sont cru (plusieurs physiologistes) que les nerfs d'un coté, naissent du coté opposé; et qu'il y a entrecroisement dans chaque paire, non seulement au cerveau, mais encore *a la moelle épinière*.

Bichat's Anatomie Generale, tom. 1, p. 120.

Upon the whole, it does not appear that Sœmmering brings forward any decisive evidence of his own upon this matter.

SABATIER describes the medulla spinalis as composed of two lateral columns, placed close together, and separated, both in the anterior and posterior parts, by a furrow, into which vessels enter. He has not observed the fibres which some have described as passing from one side of it to the other*.

VICQ. D'AZYR has particularly attended to the structure of this prolongation, and is likewise of opinion, that it consists of two lateral columns pressed together, and having a furrow between them through the whole extent of both the anterior and posterior surfaces. In the anterior part, between the columns, and some way below the surface, he has observed, through the whole length of the medulla spinalis, a white and very fine lamina, which he conceives acts the part of a species of corpus callosum or commissure, joining the two lateral columns. In the posterior part, on separating the edges of the sulcus, instead of a white lamina, he found a portion of cortical matter, which was disposed longitudinally in the centre of each spinal column, and stretched over from one side to the other, as a kind of cortical commissure. In the medulla oblongata, the

* Sabatier sur quelques particularité's de la structure de la moëlle de l'epine & ses enveloppes.

Memoires de l'acad. Royale des Sciences pour l'année 1783.

same structure prevails, except that on separating the edge of the sulcus, between the corpora pyramidalia, some fibres present themselves, which he says are always either transverse, or a little oblique, but never decussate; and which he supposes, like the lamina mentioned above, also act as commissures*.

From the accounts which I have given of the observations made with regard to the structure of the medulla spinalis, by some of the principal authors, there seems to be no sufficient evidence for believing, that there is a regular decussation of the fibres of this body, or a propagation of nervous influence from one side of it to the other. All anatomists admit the existence of two longitudinal columns in the spinal marrow; and Sœmmering's idea of the fibrils of the spinal nerves every where belonging to the opposite side of body to that in which they are dispersed, seems to be only an inference, made from a supposed analogy to what he considers as applying to the structure of the medulla oblongata, without its being supported by any observations mentioned by him, on the structure of the medulla spinalis itself. Anatomical inquiry on this subject is very difficult; and the different accounts of it, given by the best anatomists, shew that it is in want of further investigation.

* Vicq. d'Azyr's Recherches sur la structure du cerveau, &c. troisième mémoire; Memoires de l'Acad. Royale des Sciences pour l'année, 1787.

I shall proceed to inquire, how far experiment, observations made in disease, or the structure of analogous parts in other animals, will throw any light on the particular questions which I have stated relative to the spinal marrow.

The power which the spinal marrow has in the propagation of nervous influence, seems to have called for the particular attention of Galen. He states with precision, the effects of dividing the spinal marrow at different parts of its course transversely, and then goes on to the consideration of longitudinal, and semi-transverse divisions. Where the spinal marrow was divided longitudinally, he found that none of the nerves which were derived from it on either side, were paralized; when transversely, that the nerves only were paralized, which were directly below the part divided on the same side*.

If it is true, that in the spinal marrow, the fibres, or other medium of the propagation of nervous influence, decussate in such a manner, that the influence afforded to the nerves of one side, is supplied from the other, it seems to follow, that a longitudi-

* Κατὰ μὲν τὸ μῆκος ἄνωθεν κάτω μέσος ἰσθμίᾳ διαιρέσει τεμνόμενος ὁ νωτιαῖος, ὑστέρου τῶν ἐν τοῖς μασοκλυρίοις παραλύει νεύρων. ὅτι τὰ κατὰ τὰ δεξιὸν μέρος ὅτι τὰ κατὰ θάτερον, ὥσπερ ὑδὲ τα κατ' ὀσφὺν ἢ σκίλη. διάγκαρσίας δὲ ἐκτιδὰν διαιρεθείη μόνον αὐτο τὸ ἥμισυ μέρος εἴτ οὖν ἀριστερὸν εἴτε δεξιὸν; ἅπαντα ἴξης παραλύεται τὰ κατεύθυ τῆ τμηθέντος μερους νεῦρα.

Galen de Anatomicis Administrationibus, lib. 8. sect. 6.

nal incision of the spinal marrow, such as was made by Galen, will have the same effect as a transverse one, in producing a paralysis of both sides; for if the propagation is either oblique or transverse, a longitudinal incision must interrupt it.

It likewise appears to be a fair inference, that if the two sets of fibres mutually intersect each other, and if in consequence, the nervous influence is propagated in the mode of decussation, one side of the spinal marrow can neither be pressed upon, nor otherwise hurt, without injury to the functions of the nerves proceeding from both sides: for the spot where the injury is received, must be both the origin of nervous influence to the opposite nerves, and the place whence nerves are actually given out, though deriving their energy from the contrary side.

In Spina Bifida, cases are sometimes met with, in which water is contained in a species of canal in the middle of the spinal marrow, communicating with the fourth ventricle; and hence it has been supposed by some, that this canal exists naturally. The probability of such a circumstance is noticed by Portal; and Sabatier and Boyer evidently give credit to its occasional occurrence*. In such instances, the pro-

* L'examen de la moelle epinière de divers sujets, a fait voir dans son milieu, un canal grêle, qui descendoit plus ou moins bas, et qui communiquoit superieurement avec le quatrième ventricule; il paroit convenable de penser que ce canal existe natu-

pagation of nervous influence would most likely have been interrupted, and a paralysis in the parts below produced, if there had been a decussation of fibres, and a crossing of nervous influence in consequence of it, in the course of the vertebral column. It may be remarked too, that in the course of the spinal marrow of some animals, there is a species of canal found, containing a portion of fluid. This is the case with the eagle and most other birds;* and I am informed by Mr. Cooper, that a similar structure was lately shewn him by Mr. Sewell, of the veterinary college, in the spinal marrow of a horse.

rellement, mais qu'il ne devient bien apparent, que par état de maladie, comme dans les sujets morts du Spina Bifida; chez eux, on trouve quelquefois un canal bien formé au milieu de la moelle épinière, & dans une assez grande étendue.

Portal's Cours d'Anatomie Medicale, tom. 4. p. 62.

Portal in a paper on Spina Bifida, in the Memoirs of the Royal Academy of Sciences for 1770, gives the case of an adult, in whom such a canal was found without the production of paralysis.

Sabatier says of this canal " cependant elle n'est pas encore " prouvée par un assez grand nombre de faits, pour être regardée " *comme constante.*" *Sabatier's Traité d'Anatomie*, tom. 2, p. 45.

Boyer makes the same remark, and nearly in similar words.

Boyer's Traité Complet d'Anatomie, tom. 4. p. 65.

Morgagni mentions an example of there being, in the body of a fisherman, a natural canal of considerable size and extent, in the middle of the spinal marrow, at its upper part. He does not remark that there had been any paralytic affection, and speaks of this, as a well marked example of not an unfrequent occurrence. *Morgagni's Adversaria Anatomica 4, Animad.* 14.

* *Perrault's* description anatomique de trois aigles. Mem. de l'Acad. Royale de Sciences, tom. 3.

In insects and worms, the medulla oblongata comes from the brain in two separate columns, which continue disunited through the whole extent*.

These analogies afford a certain degree of presumptive evidence in favour of the directly downward propagation of nervous energy, and of a certain degree of independence which one side of the spinal marrow has of the other; and against the decussation of fibres, or the existence of any particular structure necessary to the decussation of nervous influence: since it is difficult to conceive, that a canal, or division, such as I have noticed, is compatible with a regular interchange of nervous energy, when the fibres, or medullary matter which is supposed to be the medium of its propagation, are interrupted.

Some instances have been known, in which persons wounded in the spinal marrow, have lived for a considerable time, and without any paralytic affection supervening. In such cases it is probable, that the medulla spinalis has been longi-

* Dans les insects & les vers, la moëlle épinière est formée dans son principe, de deux cordons paralleles & écartés l'un de l'autre, & chacun de ces cordons est composé de tumeurs ganglioformes, d'ou sortent des Nerfs qui en sont eux-mêmes dépourvus. J'ai fait voir que dans l'homme, la moëlle epiniére peut être également divisée en deux parties laterales trés-distinctes. *Vicq. d'Azyr's* suite des recherches sur la structure du cerveau. Mem. de l'Acad. Royale des Sciences pour l'année 1783.

tudinally, and not transversely divided;* since it is well known, that when a transverse incision has been made, either by design or accident, a paralysis of the parts beneath was the consequence. On the principle of decussation, it is indeed difficult to conceive a wound of the spinal marrow in any direction, which would not have the effect of dividing a part of the medium of nervous communication.

A case lately occurred to my friend Dr. Marcet, physician to Guy's Hospital, which was seen by him in consultation with Dr. Baillie and Dr. Bourne of Oxford, and was attended by a great number of very anomalous symptoms, particularly severe pains in the left side of the abdomen. In this case, a tumour was found on dissection, pressing upon the lower dorsal vertebræ on the left side, which had rendered carious the last vertebra but one. A paralysis of the lower extremities came on a few days previous to death, which was much greater in the left side, where the tumour pressed, than in the right†.

* Mais dans la plupart de ces cas cités, où la moelle épinière n'avoit pas été atteinte, ou ne l'avoit été qu'à, sa partie inférieure, & longitudinalement; de maniere que, les filets de la substance médullaire de ses nerfs, avoient été vraisemblablement plutôt désunis, que coupés.

Portal's Cours d'Anatomie Medicale, tom. 4, p. 111.

† Portal mentions a case, from which he considers it as proved, that an injury of one side only of the spinal marrow, as well as of the medulla oblongata, gives rise to convulsions or paralysis of the opposite side of the body. It is of a

The result of Galen's experiment of the longitudinal division of the spinal marrow, seems, with the other circumstances which I have mentioned, to render any decussation of nervous influence in the course of the medulla spinalis extremely improbable. The other experiment stated by him, of the effects of a semi-transverse division of this body, may be considered as decisive of the question; but, at the same time, as the expressions employed by him in narrating it are not very precise, though there appears to be no doubt that they bear the interpre-

female, who was, for a long period, affected with convulsions in her left leg, at the time of the menses; and when they ceased, the limb became paralytic. Soon afterwards, the arm of the same side became convulsed, and in a short time she died of what he calls a comatose affection. The arachnoid coat and pia mater of the medulla spinalis, at the last dorsal and first lumbar vertebræ, were found to be inflamed; and the medulla itself to be red and soft on the right side, but sound throughout its whole extent on the left.

On this case I beg leave to remark, that the cause of the paralysis seemed to be in some way connected with that of the convulsions; but the arm became convulsed, without any cause being discoverable by dissection in the upper part of the spinal marrow; and a comatose affection came on, which destroyed the patient, and yet no diseased appearances are mentioned which can account for it. The coats of the spinal marrow, it would appear, were inflamed all round, though in the marrow itself, the affection was only seen on the right side. For the affection of the arm, and the coma, the diseased appearances [illegible] not account; and had these appearances been of long standing, the coats must have been much thickened, instead of only exhibiting the marks of recent inflammation. The state of the brain itself is not mentioned. *Portal*, l. c. p. 116.

tation stated above; and as it was desirable to ascertain the accuracy of Galen as an experimentalist, I considered it proper that the experiment should be repeated*. I therefore requested my friend Mr. Astley Cooper, surgeon to Guy's Hospital, to repeat, on a dog, the experiment of dividing one half of the spinal marrow transversely. The following is the account of the mode of performing it, and of

* I have the authority of two gentlemen of very distinguished classical attainments, for the interpretation given of the paragraph in question. It is very singular, that Haller quotes the particular section of Galen, from which this paragraph is taken, for the statement mentioned at page 187, that when one half of the spinal marrow is cut through, the muscles of the opposite side are paralised. I may remark, that this is the only passage in the section which bears upon the question.

The authority of Aretæus is quoted by Haller, among some others, for the observation also mentioned in a note at page 187 of this paper, in which it is stated, that a partial injury of the medulla spinalis, short of division, produces a paralytic affection of the muscles of the opposite side. On referring however, to the passage, in book 1st, of the Chronic Diseases, chap. 7th, it appears, that an inaccuracy has crept into Haller's great work, similar to that mentioned relative to the quotation from Galen; and that the opinion meant to be conveyed by Aretæus is, that in consequence of an injury done to one side of the spinal marrow, the nerves of the same, and not the opposite side are paralysed. The passage is the following:—Ην μεν οὖν τῆς κεφαλῆς κάτω πάθη, τις ἀρχὴ, ὁκοῖον τι τε νωτιαιῳ μυελῳ ἡ μῆνιξ, τὰ ὀμώνυμα και ξυναφέα παραλύεται, δεξιὰ μεν δεξιοῖσι, και εν' ἀριστεροῖσι λαιά. Ην δε κατάσχη κεφαλὴ, εν μεν τοῖσι δεξιοῖσι, τα λαια παραλύεται· δεξια δε εν' αριστεροισι.

the circumstances which we noticed in consequence of it.

After dividing the integuments, and dissecting down to the sheath of the spinal marrow, between the occiput, and the first vertebra, part of the sheath was removed, and the spinal marrow laid bare. The point of a probe was then thrust into the spinal marrow at its raphé, and into the wound made by it, the end of an eyed probe was introduced. By this last, the marrow was divided on the right side.

Immediately after the division, the animal seemed dead and stiff, its efforts to resist having entirely ceased. On taking away the ligatures by which it had been secured, all its limbs still appeared rigid; but in the course of two or three minutes, it was observed, that the elevation and depression of the ribs in respiration, were almost entirely confined to the left side. When the animal was laid upon its back, it was found that both the extremities of the left side were more stiff than those of the right; and that on bending them, they immediately recovered their position, and remained stretched out. The extremities of the right side on the other hand, were more flaccid, and retained any position in which they were put.

There was a degree of tremor in the muscles of the left extremities, which was principally observed during inspiration, and when the animal lay on the

side in which the spinal marrow had been divided. The tail, at the basis, was drawn to the left side.

The animal turned over twice, within half an hour after the operation; but the movement was made by the action only of the left side, the right remaining flaccid. He several times made an attempt at stretching himself, in which he succeeded so far, as to extend and draw back the extremities of the left side. His respiration was full and equable; but the action of the intercostals seemed, as before remarked, to be confined to the left side. He two or three times made a barking noise. He could move his head slightly, and seemed to have the full power of motion over his eyes and eyelids, and the muscles of his face. His hearing was not affected. He twice passed his urine in the course of a few hours. He did not lap, when milk was set before him, and he was lifted up and his mouth put to a vessel containing it; but when a small portion was poured into his mouth, he moved it about with his tongue, and seemed to swallow it.

The flaccidity of the side in which the operation was performed, increased; but in a couple of hours he had a slight power of motion over the tail, which gradually augmented, so as to enable him to move it back and forward pretty readily.

He lived till the following morning, and was seen by Mr. Cooper, a short time previous to his death.

He was then affected with convulsions in both sides, which were less in that in which the operation had been performed, than the left. He seemed also, at this time, to be able slightly to extend the extremities of the same side. The respiration went on as it had before done, and was still unattended with any action of the right intercostal muscles.

On the second evening after his death, we examined him. The pia mater, near the place where the operation was performed, was much inflamed; and when it was removed, the medulla spinalis was found to have had its right half very accurately divided. The choroid plexus was more turgid than ordinary, and the bottom of the ventricles, particularly of the fourth, and that part of the third which was nearest to the passage to the fourth, was covered with minute red vessels.

From the above experiment, there appears to be a decisive confirmation afforded of Galen's accuracy, and of the opinion which the circumstances above mentioned seem to favour, viz. that the same law as to the seat of paralysis, does not apply to the medulla spinalis which applies to the encephalon. At the same time, however, there is reason to suppose, that the two sides of the medulla spinalis, are not perfectly independent of each other: for, immediately after the operation, the whole body was for some time rigid; and before death, both sides were

affected, though unequally, with convulsions. This last circumstance, together with the power which the animal recovered over the motion of the tail, and the slight resemblance of voluntary exertion which appeared in the extremities of the right side, seems to shew, that a reciprocal influence exists between each side of the spinal marrow; or between each side of the body, by means of nervous inosculations. Vicq. d'Azyr's anatomical observations on the structure of the spinal marrow, are in favour of the former opinion.

I may remark, that the circumstance of Galen's not noticing any thing but the result of his experiment, does not at all affect his accuracy; because he refers for minute particulars to the fourteenth volume of his works, which has never been found.

Much of the reasoning, and many of the facts which render it probable, that nervous energy is propagated directly downwards in the spinal marrow, and does not decussate, seem to apply likewise to the medulla oblongata; for the one is regarded by anatomists as a mere continuation of the other, and by many of them is considered as not at all different in structure*.

* La moëlle de l'épine est le prolongement de la moëlle alongée, dont elle ne différe pas, que par ses dimensions & par le lieu qu'il occupe.

Sabatier's Memoire sur quelques particularités de la structure

Some experiments, however, made by M. Lorry, and published by the French academy of Sciences, in their Memoires des Savans etrangers, seem to him to prove, that a wound or division of one side of the medulla oblongata, will produce a paralysis of the opposite side of the body; in which case it would follow, that this substance, of which the spinal marrow is a direct continuation, does not follow the same law to which the latter is subject on pressure or other injury, but is obedient to that which regulates the encephalon in general*.

Such experiments, it must be owned, are very liable to error; both from the part to be wounded being incapable of injury, without neighbouring parts also suffering; and from the discharge of blood

de la moëlle epinière & ses enveloppes. Memoires de l'Acad. Royale des Sciences, 1783.

A spinali medulla non credidi separari debere, quæ nullo evidante limite distinguatur, cum ne transitum quidem per atlantem in hominis integro cerebro, facile sit aguoscere.

Haller's Elementa Physiologiæ, tom. 4, p. 79.

—nor perhaps is the medulla oblongata to be considered in any other light, than as the beginning of the spinal marrow.—

Bell's Anatomy, vol. iii. p. 110.

Sœmmering gives the term of medulla spinalis to the medulla oblongata, as well as its continuation the spinal marrow.

Sœmmering, tom. 4, p. 75.

* Lorry sur les mouvements du cerveau. Memoires des Savans Etrangers, tom. 3, 1760.

in some degree affecting the result of the experiment. It is therefore rather by the accidental observations which the study of morbid anatomy furnish, than actual experiment, that legitimate conclusions, concerning the precise influence of such a deep seated part, are to be drawn.

The animals on which M. Lorry principally made his experiments were pigeons; and on wounding, by ten or twelve punctures, the medulla oblongata on either side, he found that there was a certain degree of weakness produced on the opposite side of the body. It may be remarked, however, upon these experiments, on which he seems to have laid the principal stress in the establishment of his conclusion, that the medulla oblongata follows the same law to which the encephalon is subject in compression or other injury, both that the results were not perfectly unequivocal, and that the animal to which he principally confined them, was not, in the structure of the encephalon, well adapted for them.

Pigeons, and other birds, have only one lobe in the cerebellum; and in the place of having a tuberculum annulare, in which the crura of the cerebrum and cerebellum unite, are without that organ*. The

* *Cuvier's* Leçons d'Anatomie comparée, tom. 2, p. 161. *Lawrence's* Blumenbach, p. 299.

Haller & Vicq. d'Azyr mention the existence of a tuberculum annulare or pons in birds; but from a comparison of what they say upon this point in different parts of their observations on

upper part of the medulla oblongata seems to answer the purpose of the tuberculum annulare; but as the crus of the cerebellum goes into the medulla oblongata, at some distance behind the union of the crura of the cerebrum, and at but a short space from the occiput, it seems likely that in making punctures, particularly in ten or twelve places, he would injure the medulla oblongata, at the place where the cerebellum joins it, and thus defeat the object of the experiment.

We are not informed of the particular mode in which these experiments were made, except as far as I have stated it; but they could hardly, it appears to me, be performed, without injuring the cerebellum, a circumstance which I should think would materially affect their results: and indeed the same effect which is attributed to a wound of the medulla oblongata, followed, in another experiment made by him, the mere puncture of the cerebellum, when it was made expressly to avoid the medulla oblongata; though in this experiment he does not mention the side in which the weakness was produced. It may also be remarked, that slight effusions of blood were

the anatomy of birds, it is evident, that they both refer to that continuation and expansion of the medulla spinalis, into which the arbor vitæ of the cerebellum enters, and which may be more properly designated as the medulla oblongata, than the tuberculum annulare.

Haller's Opera Minora, tom. 3, p. 193, &c.

Vicq d'Azyr, l. c.

found on the medulla oblongata, on the side opposite to that which had been punctured.

M. Lorry's experiments therefore, seem to be deficient in the evidence necessary to establish the conclusion, that an injury on one side of the medulla oblongata, produces a paralysis in the opposite side of the body*.

The pathological evidence of which we are in possession upon this subject, seems to be in favour of the idea, that a wound or pressure on the medulla oblongata, as well as on the medulla spinalis, will affect the same, and not the opposite side of the body.

It is a matter of common observation, that the tongue and velum pendulum, and occasionally the muscles of deglutition, are affected, in hemiplegia, in the same side, as that in which other voluntary muscles are paralised; and by a cause acting in the opposite side of the head†. When we

* M. Lorry, though he trusts principally to his experiments on pigeons, mentions one experiment on a dog. The result of this however, was not perfectly unequivocal; and in addition to the sources of error which I have stated as likely to attend experiments on the medulla oblongata, I may mention, as an objection to it, that it was not followed by an examination after death.

† I have not noticed the paralysis of the muscles of the face, not only because it is difficult to ascertain whether it arises from

consider, however, that this circumstance can only take place from an affection of the glosso-pharyngeal or lingual nerves, which arise at, or near the upper part of the medulla oblongata, there is reason to suppose, that there is not only a certain degree of independence which one side of the medulla oblongata has of the other, but that, in the phænomena exhibited on nerves proceeding from it, by the effects of pressure on the opposite side of the brain, it is completely assimilated to the spinal marrow. This opinion, also, receives some degree of support, from the analogy which the structure of the medulla oblongata bears to that of the medulla spinalis, and from the division which exists in the former, as well as in the latter, in some species of animals.

When we advance further in the encephalon, in the inquiry as to the effects of pressure, the difficulties of obtaining any precise or particular information increase.

That pressure on the tuberculum annulare on one side, affects the opposite side of the body, is evident

an affection of a branch of the fifth pair of nerves, or of the portio dura of the seventh, both which supply the face; but because the origin of the latter has been referred by some distinguished anatomists, to the crus of the cerebellum, and not to the upper part of the medulla oblongata. In this case, it is obvious, that the same reasoning could not be applied to the portio dura of the seventh pair, which I have considered as applicable to the glosso-pharyngeal and lingual nerves.

from the case which I have given at the commencement of this paper, in which the tumour discovered was found on the left side, while the paralytic affection was on the right.

The effects of pressure on either hemisphere of the brain in producing paralysis on the opposite side of the body, is a fact which is noticed by almost every pathological writer since the time of Hippocrates, and is that from which the general law relating to the encephalon has been deduced*.

Whether the cerebellum is similarly circumstanced with the cerebrum in the effects of pressure, is a circumstance concerning which doubts have been entertained.

* It sometimes happens, that a hemiplegia has its cause in the same, and not the opposite side of the brain. Haller quotes some instances of this. Vid. Elementa Physiologiæ, tom. 4, p. 333. Some other authors notice the same. This must be regarded as one of those deviations from the ordinary laws of the animal œconomy, which are occasionally observed in every part of the body.

From the following Aphorism deduced from anatomical observations on injuries of the head, Vicq d'Azyr seems to doubt the fact. " Que la paralysie se montre toujours du coté opposé a la compression, puisque dans une circonstance où les muscles s'affoiblîrent du même coté que la blessure, l'épanchement, par l'éffet de la commotion, s'étoit fait dans un point opposé a celui du coup."

Œuvres de Vicq d'Azyr par Moreau, tom. 5. p. 359.

Morgagni mentions two or three examples in support of them. Bianchi published a case expressly of this kind, and Portal gives some credit to the circumstance, but says, that it is not sufficiently proved to be considered as an established point of doctrine*. That this point should not yet have been fully ascertained, may perhaps be owing to injuries of the cerebellum, and morbid alterations in that body, having been much seldomer the subjects of observation, than such as appertain to the cerebrum.

An inquiry into the cause why one side of the body is affected by pressure on the opposite side of the head, and not the other or both, is still more difficult than an examination into the particular facts on this subject, as applying to the different parts of the encephalon.

The most reasonable cause which, as far as I can judge, has been assigned for this phænomenon, is that of a decussation taking place somewhere in the sensorium, or its prolongation the medulla oblongata or spinal marrow, by means of which the nervous energy, instead of being propagated in a straight line, proceeds crosswise.

* Morgagni de sedibus & causis morborum, epist. 52, sect 27.

Bianchi's storia medica d'una postema nel lobo destro del cerebello.

Portal's leçons d'anatomie medicale, tom. 4, p. 105.

This is the idea proposed by Aretæus, and assented to by almost every pathologist since his time*.

The appearance of transverse, oblique or decussating fibres in the medulla oblongata, on separating the edges of its raphé, has been regarded by some as affording a proof, that the decussation which is conceived to be necessary, in order to account for the phænomenon in question, takes place in this body. There seems, however, to be no evidence of this, further than the existence of fibres, which Haller, Morgagni, and Vicq d'Azyr, though they admit them, do not consider as decussating. Santorini referred the place of decussation to the tuberculum annulare, as well as the medulla oblongata; and was induced to consider it as taking place in the latter, from the circumstance of the existence of fibres, which appeared to him to decussate†. We are informed, however, by Vicq d'Azyr, that M. Girardi, the editor of the posthumous works of Santorini, examined thirty-four brains in order to ascertain whether the decussation mentioned by him takes place, but was

* Aretæus states, that the nerves, instead of running in straight lines from their origin to their termination, decussate in the form of the Greek letter X; ἀλλήλοισι ἐναλλαξάμενα ὡς χιασμοῦ σχήματος. *Aretæus de causis & signis diuturnorum morborum*, lib. 1. cap. 7.

See also Morgagni de sedibus & causis morborum, and Burserii Institutiones Medicinæ practicæ, tom. 3, p. 70.

† Santorini's Observationes Anatomicæ, cap. 3, sect. 12.

not able to convince himself of the fact*. Vicq d'Azyr himself, considers the fibres as nothing more than commissures, and not at all connected with the phænomenon in question†; and Boyer is of opinion, that the decussation of the fibres of the medulla oblongata cannot be at all demonstrated‡.

Sabatier, on the other hand, conceives that the appearance of fibres at all, where they have been described, is merely owing to the medulla

* Vicq d'Azyr's Traité d'Anatomie & de Physiologie, p. 110.

† S'il n'est permis de parler de mes travaux, apres avoir rendu compte des ceux des anatomistes les plus distingués, je me contenterai de dire, qu'en écartant les corps pyramidaux, j'ai vû entre eux, non des fibres qui se croisent, mais de petits cordons qui se portant d'une coté a l'autre, les uns transversalement, les autres obliquement, font dans la moëlle alongée, l'office des commissures. ib. p. 110.

M. Petit, of Namur, was one of the first who mentioned the existence of decussating fibres in the medulla oblongata. I have not, however, been able to procure a sight of his memoir. Vicq d'Azyr gives him great credit as an anatomist, but says of his opinion relative to this point, " On peut lui reprocher, " d'avoir montré peut être, un peu de prevention, dans le " système qu'il avoit adopté, sur le croisement des fibres du " cerveau."

Vicq d'Azyr's recherches sur la structure du cerveau. Mem. de l'Acad. des Sciences, 1787.

‡ Mais l'entrecroisement des fibres de la moëlle alongée ne peut être demontré en aucun manière, et n'est rien moins que prouvé par l'anatomie.

Boyer's Traité complet d'Anatomie, tom. 4, p. 63.

being torn, from the tension of the vessels which penetrate it. As these vessels enter the furrow in a direction perpendicular to the medulla, and are not capable of yielding, he supposes that the medulla between each vessel is torn, and gives the appearance of medullary fibres having been divided*.

The fibrous appearance of the medulla oblongata, however, if we even admit that it is completely unequivocal, will not go to the extent of proving, that a decussation of nervous influence takes place in the course of it. Soemmering states, that this fibrous decussation commences immediately below the origin of the lingual nerves; but it must necessarily have taken place previous to this, otherwise, it appears to me, as I have had occasion to remark above, that

* Je crois pouvoir assurer, non-seulement, que les fibres ne souffrent pas d'entrecroisement, mais encore, qu'elles n'existent pas. Elles ne me paroissent être autre chose, que le résultat de l'espèce de déchirure que souffre la moëlle de l'épine, par la tension des vaisseaux qui la pénétrent.

Sabatier, l. c. p. 68.

These observations are made on the subject of a supposed crossing of fibres from one side to the other of the spinal marrow. On comparing, however, the passage with the author's remarks on the medulla oblongata at page 43 of the second volume of his Treatise of Anatomy, it will be seen, that in the former, as well as the latter, he directs his remarks to the decussation described by Petit, and noticed by Haller. But as this decussation is represented as occurring in the medulla oblongata, Sabatier's observations must necessarily apply, as I have stated them, to a crossing of fibres supposed to take place in that part.

the glosso-pharyngeal and the lingual nerves, which arise in the upper part of the medulla oblongata, could not be affected (as we know they are) by pressure on the opposite side of the head, above the place which Soemmering notes as the commencement of the decussating fibres.

We are completely ignorant of the nature of nervous energy, and know but little of the circumstances under which it is generated, or the conformation necessary for its propagation. The ideas which have been entertained with regard to the brain and nerves, in the endeavour to point out the seat of decussation, are perhaps too mechanical; and in attempting to account for the mode in which the decussation of nervous energy is effected, we may readily be led into an error, if we form our deductions on this point, merely from an apparent crossing of fibres. The mode in which nature carries on her operations in the head, is very obscure; but seems to be better capable of being traced by phænomena, than by the examination of structure alone.

Santorini's opinion with regard to the place in which decussation is effected, is, that it occurs in the tuberculum annulare and medulla oblongata. The former idea is somewhat probable; since the tuberculum annulare is the first link in the chain of communication between the encephalon and spinal marrow; since there is reason to suppose, that the full effect of nervous influence is not produced till

an union of the cerebrum and cerebellum takes place, which seems to be effected in the tuberculum annulare; and since the circumstances which I have noticed in the course of this paper, are adverse to the idea of decussation occurring either in the medulla oblongata or spinal marrow.

In an endeavour to discover the particular seat of decussation, supposing that it exists, the proper object of inquiry seems to be, not so much as to the place where there may be any real or apparent crossing of fibres, as with regard to that, at which the effects of an injury in any part of the encephalon cease to be propagated in the side in which it was inflicted.

Much important information on this point might be obtained, by a minute attention to the effects which pressure on particular parts of the brain might have on particular nerves; and if it were found, that pressure on the origin of such nerves as arise from the cerebrum or cerebellum or their crura, previous to their union, affects the same, and not the opposite side of the body, it would furnish some degree of support to the former part of Santorini's opinion.

The contrariety of evidence which at present exists on the subject of the decussation of the optic nerves in the human subject, (into the consider-

ation of which it is unnecessary to enter), prevents the formation of any conclusion with regard to it, which can affect the general question of decussation in the encephalon; but the evidence which it is endeavoured to bring forward upon this subject, seems to be connected with an admission, that if decussation did take place, an injury of one of the optic thalami would affect the eye of the opposite, and not the same side; if it did not, that it would affect the eye of the same, and not the opposite side. This admission, however, would be improperly made, did it happen that the optic thalami when injured, show the effect on the opposite retina, necessarily and independently of decussation. In fish, where there is an unequivocal decussation of the optic nerves, the retina seems to be placed in some degree under the same circumstances, compared with the optic thalami, as a muscle deriving its influence from a spinal nerve, compared with the opposite side of the head. And the same it is probable would be the case, if decussation were actually found to take place in the optic nerves of the human subject.

The phænomena of hemiplegia are principally confined to such parts as derive their nerves from the medulla oblongata and spinal marrow; and it is a singular, and at present as far as I know, an unaccountable circumstance, that the senses are in

general but little affected in this complaint. Even those nerves which are concerned in mere motion, as the third, fourth, and sixth pairs, which go to the muscles of the eyes, have their powers but little affected; and this is the more remarkable in the sixth or abductors, which originate from the upper part of the medulla oblongata, and therefore may be regarded as similarly situated with the glosso-pharyngeal, or the lingual nerves, both which are affected by pressure on the opposite side of the brain*. Another curious circumstance in the pathology of the nerves is, that where the same nerves are concerned both in motion and sensation, such as the those which go to the skin, and perhaps the tongue (unless we consider it to be completely proved, that the lingual branch of the fifth pair is the actual organ of taste) the loss of the power of motion, and the loss of sensation are by no means always in the same ratio.

In the case which I related at the beginning of this paper, the left abductor nerve was affected, and consequently the left eye drawn towards the nose, though the paralysis occurred in the right side of the body. This circumstance was occasioned by the pressure of the tumour, on the left nerve of the sixth pair; but I think it likely, from what I consider as the analogy of the other nerves which arise from the medulla oblongata or spinalis, that under no circumstances of immediate pressure on the origin of one of the

nerves of that pair, would the opposite eye be affected*.

When pressure on one of the lobes of the cerebrum or cerebellum is the efficient cause of the production of paralysis, it seems to be communicated to the source of the nerves affected in this complaint, through the medium of the crura; but as it sometimes happens, that abscesses and tumours of different kinds exist in the brain for a considerable time, without producing paralysis, it is likely, that in order to give rise to it, the pressure should either be more suddenly applied than often takes place in such cases, or should more particularly affect the basis of the encephalon, and through the medium of this, the vertebral column.

The brain has a remarkable power in accommodating itself to gradual derangement; and in cases where deposition has been made, or growth taken place by slow advances, the act of absorption on the substance of the brain itself, seems to keep pace with the alteration of circumstances, and thus to pre-

* Mr. George William Young, a gentleman distinguished for the accuracy of his anatomical knowledge, mentioned a case to me, in which a distortion inwards of the left eye, was found to be occasioned by a tumour on the left side of the fourth ventricle. As the left nerve of the sixth pair was in this case affected, it tends to support the opinion given above, and seems also to shew, that the origin of this nerve is more distant than is generally imagined.

vent any undue or irregular pressure*. According to the observations of the best writers on the subject, the situation of pressure too, has a considerable effect on the nature and degree of the symptoms produced; for it has been observed, that the nearer it is to the basis of the brain, the more severe are the symptoms produced; and in particular, that when it occurs on the tuberculum annulare, it is more frequently the cause of convulsions, than when it takes place elsewhere†.

It seems to be a salutary provision of nature, that while those parts of the body which are concerned in voluntary motion, are affected in paralysis, through the medium principally of the spinal nerves, those which supply organs immediately concerned in the preservation of life, are connected as well with the brain, as with both sides of the spinal marrow. The great sympathetic nerve, by this connection, and by the number of ganglions which occur in the course of it, (which seem to afford an additional source of nervous influence,) is well adapted for preserving, in the vital organs, a species of security against that partial interruption to the propagation of nervous influence, which takes place in paralysis.

* *Bichat* accounts differently for this circumstance. "Au reste," says he, "il ne paroît pas, que chaque hémisphere corresponde toujours, d'une manière nécessaire, avec les nerfs moteurs qui lui sont opposés. En effet, souvent on a observé à droite des épanchemens ou des lesions de la substance cerebrale, sans alteration des mouvemens à gauche & reciproquement." *Bichat's Anatomie Generale*, tom. 1. p. 121.

† Baillie's Morbid Anatomy, p. 458.

What the final cause may be, of that singular fact in the propagation of nervous energy, to which chiefly I have taken the liberty of requesting the attention of the society in the present paper, it is perhaps impossible to form any rational idea. The mode of its production seems to be principally capable of being discovered, by a minute attention to the symptoms of paralysis, and an accurate observation of the precise seat of morbid appearances in the brain and spinal marrow. The practical utility of such an inquiry, may at first sight appear somewhat problematical; but it nevertheless can hardly be doubted, that every circumstance which may tend to increase our knowledge of the connection of symptoms with diseased appearances, and of the particular course which nervous energy follows in its propagation, must ultimately prove useful.

Since this communication was presented, I have seen in the Edinburgh Medical and Surgical Journal for January 1809, the translation of a very valuable report, on a memoir of Drs. Gall and Spurzheim relative to the anatomy of the brain, by a committee of the national institute, consisting of Messrs. Tenon, Portal, Sabatier, Pinel and Cuvier*.

In one part of this report, a point of structure is

* The memoir, we are informed, is strictly confined to anatomical observations, and does not at all touch upon the speculations of Professor Gall, on the special functions of the different parts of the brain.

noticed, which is considered as demonstrating the existence of decussation, and pointing out its seat.

"When we separate from each other the two infe-
" rior cords of the medulla oblongata and spinal
" marrow, we see that they are separated by a pretty
" deep fissure, the bottom of which is occupied by
" transverse medullary filaments. This fissure is
" only interrupted at one place, which is what now
" engages our attention, and which is only two or
" three lines in length. The fibres of the pyramidal
" eminence of one side form there, three or four
" filaments, as the hairs of a mat, and which are
" blended afterwards with the rest of the medullary
" cord, into which they thus enter obliquely."

The authors of the report seem to regard this circumstance of structure, as accounting for the production of paralysis in one side of the body, by injury on the opposite side of the brain; and they express their surprise that a point of structure so evident "should have been doubted by the great Haller,
" recently denied by very skilful men, and confounded
" by others, among whom may be reckoned Vicq
" d'Azyr himself, with that of the transverse fibres
" which re-united, in their whole length, the lateral
" parts of the medulla oblongata."*

* To the authorities mentioned in the report, (those of Winslow, Lieutand, Portal, and Santorini) as evincing, that this point of structure had been noticed by former anatomists, but of late unaccountably overlooked, I may add that of Duverney, who designates a similar structure in plate 3, fig. 5, and thus

I have had occasion to notice, at page 211, the degree of weight which I consider as attaching to the existence of decussating fibres in the medulla oblongata, and it does not appear to me that the reasoning which I there employed, is affected by the decisive evidence of the existence of decussating fibres afforded by the accurate observations of Drs. Gall and Spurzheim, and of the learned authors of the report made upon their memoir. If we find that pressure on the opposite side of the brain, will affect such nerves as are sent out from the medulla oblongata, above the place where this appearance of decussation is seen, it seems to be evident, that the decussation occurring at this place, and confined to a very small portion of the thickness of the whole column, is not the means by which the phænomenon is produced.

describes it: "Quand on écarte les éminences pyramidales, "on voit près de leurs extremités, deux ou trois trousseaux de "fibres, dont les unes passent du côté droit de la moëlle au "gauche, & les autres vont dans un sens contraire."

Duverney Œuvres Anatomiques, tom. 1, p. 47.

I have noticed above, the observations of Santorini, but was disposed to consider the opinion of Vicq d'Azyr as conclusive against them. It may be remarked, however, (as I have also stated) that Santorini's observations go to prove, that decussation takes place, as well in the tuberculum annulare, as the medulla oblongata.

Sœmmering, I am inclined to think, alludes to this point of structure in the quotation given in the note to page 188.

Should the portio dura of the auditory nerve be affected in paralysis of the face, additional force is given to this argument; since it has been proved, both by the authors of the memoir, and by the committee to whom we are indebted for the report, that this nerve arises from the medulla oblongata, near its union with the pons varolii, and not from the crus of the cerebellum.

SECOND CASE OF CAROTID ANEURISM.

BY ASTLEY COOPER, ESQ. F. R. S.

SURGEON TO GUY'S HOSPITAL.

Read Feb. 21, 1809.

IN the year 1806, I had the honour of presenting to this Society an account of an operation for carotid aneurism, which terminated unsuccessfully.

I then took the liberty of observing, that I thought that the result of that case ought to have no influence in preventing a similar operation under more favourable circumstances, as the death of the patient was attributable to the advanced stage of the disease at the time of the operation. The aneurismal tumour had become so large, as to press upon the air tube, and occasion cough, difficulty of breathing, and even effusion of coagulable lymph upon its internal surface; and it had also compressed the pharynx, in a degree to prevent even the passage of fluids into the stomach.

I had no apprehension of the functions of the brain sustaining any permanent injury from a ligature on the carotid artery, having the evidence of Dr. Baillie to prove, that one carotid had been entirely obstructed, and the diameter of the other considerably lessened in the same person, without any apparent ill effects. I have also given a drawing in my former paper, of the left carotid artery being obstructed by the pressure of an aneurism of the aorta; and we have the analogy of animals to show, that both carotids may be tied without any visible effect upon the functions of the nervous system. I had many years ago made the experiment of tying these vessels in the dog, and immediately as it was concluded the animal was placed upon the ground, and shewed no diminution of voluntary powers. It exhibited the same fears and affections as before, and betrayed no greater loss of appetite, or disposition to sleep than an animal usually does who has been the subject of an experiment which gives some pain, but does not injure the vital functions. A preparation made from this dog has been long preserved in the collection at St. Thomas's Hospital; and the parts have been injected to shew the principal vessels which carry on the circulation, which are the two thyroideal arteries, and two branches from each vertebral, passing under the angles of the lower jaw.

I was therefore resolved to take the first opportunity of repeating the operation before the disease had advanced so far as to interrupt, in a considerable

degree, any other function than that of the passage of blood through the carotid artery; and my friend Mr. George Young, surgeon, had the kindness to furnish me with a case of the most favourable nature, by sending, first to my house, and afterwards to Guy's Hospital, a man who was in all respects the subject I should have chosen. He had a mind cool and firm, yet obedient to every injunction: a body equally unirritable as his mind—the tumour only about two inches and a half in diameter, and the neck of considerable length, so as to give ample space for exposing the carotid artery. The history of this case is as follows:—

HUMPHREY HUMPHREYS, aged fifty, who has been employed to carry loads of iron* as a porter, observed six or seven months ago, a tumor, having a pulsatory motion, and about the size of a walnut, on the left side of the neck, just under the angle of the jaw, and extending from thence downwards to the thyroid cartilage. It was accompanied with great pain on the left side of the head, which began about five months ago, and was attended with a sense of pulsatory motion in the brain. The tumour affected his speech, so as to make him extremely hoarse; and he had more recently a cough, attended with slight

* The employment consists in this.—A collar of wood is placed around the neck and upon the shoulders, and he carries bars of iron on each shoulder, thus protected.

difficulty of breathing, and which seemed to be the effect of the pressure of the swelling on the larynx. His appetite was sometimes affected by it; for three or four days he eat heartily, and then for many lost his relish for food. He had a sense of coldness succeeded by heat in his left ear, and he often became sick when eating, but did not vomit. Upon attempting to stoop at any time from that period, he had an insupportable feeling as if his head would burst; a giddiness; loss of sight; and almost total insensibility.

The left eye, which had for some time been gradually closing, appeared now not above half as large as the right; yet its power of vision was equally perfect.

A blister was at this time ordered to be applied on the head by Dr. Hamilton, which lessened his pain. A month ago he applied another with the same relief; but it lasted only for a few days. He continued at work until the day previous to the operation.

The dilatation of the carotid artery was seated just below the angle of the jaw, and about the acute angle which is made by the great division of the common carotid. The tumour was about the size of a pullet's egg, and prominent in its middle.

The pulsation of the aneurism on the day of the

operation was remarkably strong; when the sac was emptied by pressure on the artery below, the tumour sprang to its original size with one contraction of the heart.

I proposed to tie the common carotid below the dilated part, and the operation was performed at one o'clock on the twenty-second of June, 1808, at Guy's Hospital.

I began my incision opposite the middle of the thyroid cartilage from the base of the tumour, and extended it to within an inch of the clavicle, on the inner side of the mastoid muscle. On raising the margin of this muscle, the omo-hyoideus could be distinctly seen crossing the sheath of the vessels, and the nervus descendens noni was also exposed. I next separated the mastoid from the omo-hyoideus muscle, and the jugular vein became apparent, which being distended at every expiration spread itself over the artery. Drawing aside the vein, the par vagum was evident, lying between it and the carotid artery, but a little to its outer side. This nerve was easily avoided.

A blunt iron probe constructed for the purpose was then passed under the artery, carrying a double ligature with it. Two ligatures being thus conveyed under the artery the lower was immediately tied. I next detached the artery from the surrounding

parts, to the extent of an inch above the lower ligature, and then tied the upper. Lastly, a needle and thread were passed through the artery above one ligature and below the other. The division of the artery was then performed.

Nothing now remained but to dress the patient, and this was done by drawing the parts together, by adhesive straps, the ligatures hanging from each end of the wound, and by laying on a piece of lint retained by straps of adhesive plaister.

Mr. Vose, my dresser, (whose attention to the case was unremitted, and to whose care and knowledge many of my patients have been indebted for their recovery) now asked the patient if he experienced any unusual sensations about his head. He answered, that for the first time since two months after the formation of the tumour, he was relieved from a distressing pain which extended up the left temple, accompanied by a violent throbbing of all the arteries of that side. This pain never returned.

The pulsation in the tumour, however, had not entirely ceased, although it was so much diminished as to become obscure; but it was felt by my colleague Mr. Forster, by Mr. George Young, Mr. Dubois, jun. from Paris, who accompanied Mr. Young, by Dr. de Souza, and many others who were present at the operation. I concluded it to be the effect of

the return of blood by the internal carotid artery from the brain, in consequence of the free anastomosis which exists between the blood vessels within the skull.

The patient was put to bed, with his head elevated, and in this position he felt quite comfortable.

Three p. m. Pulse was moderate, skin cool, suffered very little pain. Pulsation in the tumour perceptible, but inconsiderable, when contrasted with its force before the vessel was tied.

Five p. m. Pulse stronger and fuller, but in other respects as before; head entirely free from pain.

Eight p. m. Patient's pulse reduced to the healthy standard, skin cool; says he feels no pain.

June 23.—*Six a. m.* Patient passed a good night.

One p. m. I saw the patient; he had a slight cough; has had no evacuation since the operation; pulse was not quicker than natural.

Ten p. m. The patient got out of bed, and went to the water-closet, and had an evacuation.

June 24.—*Six a. m.* Pulse natural; pulsation in the

tumour continues; tumour sore when compressed; has become firm, for the blood which was fluid in it prior to the operation and all yesterday is now coagulated; pain, and a sense of fullness felt on the right side of the head.

June 25.—Six a. m. Patient says he no longer feels pain in any part; has had a good night; has only one troublesome symptom, viz. an occasional rattling in the larynx from accumulated mucus; pulse this morning quite temperate.

Three p. m. The tumour is considerably diminished; pulse moderate; no constitutional irritation.

June 26.—Eight a. m. Patient had a good night; pulse still moderate; skin cool.

Eleven p. m. Still free from any disagreeable symptom.

June 27.—Seven a. m. Patient very restless during the night; coughed much and had pain in the head; spirits depressed; pulse natural.

Half past one p. m. Pulse eighty-four; feels much better than in the morning; has had an evacuation from the bowels since last night.

June 28.—Seven a. m. Pulse natural; had a tolerable night; bowels open; no pain.

One p. m. I saw the patient; pulse eighty-four; slight pulsation still to be felt in the tumour, which is much diminished.

June 29. Pulse natural; no pain; pulsation still perceptible; tumour so much less that the skin is wrinkled over it.

June 30. Wound dressed the first time, and has united by the first intention as far as the ligatures would permit; he is free from irritation.

July 1. Pulse natural; man tranquil; pulsation very obscure; tumour firm; he is very hoarse.

July 2. No stool; ordered opening medicine; very hoarse, so as to speak only in a loud whisper.

July 3. Pulsation doubtful; man healthy.

July 4. Going on well.

July 5. Wound looks well; man appears natural; but the hoarseness continues.

July 6. He is free from any symptoms of irritation.

July 8. Patient says the tumour is now only half its size at the time of the operation.

July 9. Ordered a poultice.

July 12. Ligatures projecting more; and much more discharge from the wound.

July 14. Upper ligature came away, being removed by Mr. Vose.

July 15. Lower ligature came away; pulsation very obscure.

July 17. Man walked out of his ward; the tumour at this period was reduced to less than half its size. The pulsation in it was with difficulty perceived; but it continued until the beginning of September, at which period all who saw him agreed that the pulsation had ceased, and the tumour was then scarcely apparent. The facial and temporal arteries on the left side cannot be felt.

The wound was a long time in healing, first from a sinus in the course of the ligatures, and afterwards from a fungus where the sinus had been placed.

The man was discharged cured, on the 14th day of September, and returned to the occupation of a porter at Crawshay's iron wharf, Thames-street.

The result of this case afforded me a degree of pleasure which compensated for the disappointment

I felt in the issue of the former. In a professional point of view, it was highly desirable to ascertain the possibility of saving life in a case which had hitherto proved generally fatal; and I could not but feel more than common interest in the fate of a man, who, although he well knew that the trial was new, and the risk considerable, never betrayed the smallest signs of apprehension.

Near eight months have now elapsed since the operation was performed, and he has returned to his former employment without any diminution of his mental or corporeal powers, excepting the lessened action of the temporal and facial arteries on the side in which he was operated. The tumour has disappeared, and he has not been since subject to that pain in the head, by which he had been so much distressed prior to the operation.

This aneurism, from the depth of its situation, was, I believe, seated in the internal carotid artery, and this led me to hope that the regurgitation of the blood, although at first sufficient to produce a slight pulsation in the tumour, would not continue to support its growth, because as the internal carotid passes through a foramen in the skull, a little above the swelling, it could not dilate at that part to bring down any additional quantity of blood into the sac; so that its first effect was likely to be as great as any it could produce. But if the aneurism had been of the external carotid artery, owing to the number of

communicating vessels I should not have been equally sanguine in my expectation that the pulsation would have ceased, as I have known two instances, one of a wounded radial artery, and the other of aneurism of the anterior tibial, in which the tumour continued to grow by anastomosis, after the arteries had been tied above the swellings.

CASE

OF

A FŒTUS

FOUND

IN THE ABDOMEN OF A BOY.

BY GEORGE WILLIAM YOUNG, ESQ.

Read March 16, 1808.

JOHN HARE, the subject in whom this curious phænomenon occurred, was born on the 18th of May, 1807. At the time of birth he appeared to be a healthy well formed child. He was however, soon troubled with frequent vomiting; discharging large quantities of fluid, which was sometimes of a green, atothers of a yellow colour. A peculiarity in the form of his abdomen did not long escape notice; a prominence, easily discernible, presenting itself at the upper part, a little to the left of the scrobiculus cordis. The evident increase of this tumor, and

the periodical vomiting induced his mother to consult me respecting him. I saw him first on the 3d of September, at which time he had the general appearance of a plump and healthy child. His mother informed me that he lived chiefly upon the breast, and that the milk was not returned excepting when the bilious vomiting took place; which recurred at intervals of a week or ten days. His stools were of a green colour; he appeared to suffer pain, and his sleep was much interrupted.

On examining the abdomen, I found a round smooth tumor, situated evidently within that cavity, at its fore and upper part, immediately below the margin of the chest; occupying a space, bounded by an imaginary perpendicular line drawn from the apex of the third false rib on the left side, and meeting a transverse line, passing just below the navel; so that it was placed in the epigastric and umbilical regions, but inclining to the left side. Its extent towards the right could not be ascertained, as the child always appeared to suffer when that part was pressed and the tension of the abdomen in the act of crying, rendered examination more obscure. The tumor was somewhat moveable; it was tense; and afforded a distinct sense of fluctuation at its most prominent part, where it was covered by the left rectus abdominis.

From this examination it was evident that the disease was not seated in the spleen; nor did it ap-

pear probable that it was an affection of the liver. I was therefore led to conclude that there existed in this part an original imperfection; probably a cyst adherent to the mesentery or vertebræ, distended by a fluid, and perhaps containing hydatids. With this view of the case, I saw no prospect of affording relief, excepting as far as the stomach and bowels were concerned; and, as I could not encourage his mother to expect a cure, I soon lost sight of him. It was not until the 7th of January in the present year, that she again brought the child to me. I now found him a mere skeleton clothed in skin, with a face of age and anguish. The account which was given of the interval was interesting. It was stated, that the child daily became thinner, whilst the tumor in the abdomen rapidly increased, until at length he was nearly thirty-six inches in circumference. His sufferings kept pace with this augmentation in bulk. He seldom slept, but was almost continually crying or screaming. He took very little nourishment, the pain compelling him to quit the breast almost as soon as he had been applied to it, and he refused every other kind of food. The tumor, during its increase, continued to preserve its peculiar shape; and did not equably distend the abdomen. It formed a tense projection forwards; whilst the flanks and the hypogastric region were soft. In this respect a remarkable change took place on the 23d of December, which was succeeded by some interesting phænomena.

For seven days and nights prior to this event the sufferings of the child were almost incessant; his cries were interrupted only by exhaustion and fatigue; and his death was hourly expected. On the day above noted, when his mother went to change his cloth, as she thought for the last time, she was greatly surprised to find the belly no longer tense at the part opposite the tumor, but equally soft in every part. She also perceived a remarkable change in his form. The anterior prominence was lessened, and the sides of the abdomen now projected greatly between the lower ribs and the cristæ of the ilia. He became quiet and apparently easy for two days and nights, voiding in this time, vast quantities of urine. This discharge continued about a week, and was attended by a corresponding diminution of the abdomen.

This narrative warrants the conclusion that the tumor consisted principally of a fluid contained within a distinct cyst; that this cyst was ruptured on the 23d of December; that its fluid contents escaped into the cavity of the peritoneum, and that the absorbents of this extensive membrane rapidly removed them.

The vomiting, which prior to this event had daily recurred, now wholly ceased; he became ravenous, and could with difficulty be kept from the breast; he re-gained strength, and improved in appearance. This favourable change was not of long duration. The cyst soon began to fill again; for, when I saw

him on the 7th of January, fifteen days after its rupture, the mother assured me he had already considerably increased. At this time the circumference of the abdomen was found to be eighteen inches and a half. Fluctuation could be distinctly felt in a cyst, not firmly distended; and a hard tumor was discovered, apparently floating in it, which easily slipped from the grasp; and endeavours to fix it appeared to give pain to the child.

I had now an opportunity of seeing him occasionally until the period of his death. The abdomen gradually increased, and its augmentation depended on an accumulation within the tumor, as its peculiar form demonstrated to the eye and to the touch. The child again lost his rest and appetite. Emaciated as I found him, he still further declined in appearance, and the vomiting returned. In relation to this symptom it is proper to note an appearance, often observed before by the mother, and now distinctly perceivable: prior to ejection, a pouch appeared to fill at the scrobiculus cordis, and to be pressed by the cartilages of the ribs against the tumor upon which it rested; so that, by the state of this part the mother could foretel the approach of vomiting, by which it was always emptied.

The inspection of the body after death fully explained this circumstance. On the 25th of February last he died. About twelve hours after death I examined the body in the presence of my friend

Dr. Birkbeck, whose zeal for such inquiries induced him to accompany me.

Inspection of the Body after Death.

The abdomen when measured was twenty-two inches and a half in circumference. When this cavity was exposed no fluid escaped; it was occupied chiefly by a large and nearly spherical tumor, which in parts was somewhat transparent and appeared distended by a fluid. Above it in the right hypochondrium, was seen the liver much diminished in size; the fundus of the gall bladder was turned forwards and inwards towards the linea alba. At the scrobiculus cordis, lying on the upper part of the tumor, was seen the pyloric extremity of the stomach; which fully explained the appearance observed to precede the act of vomiting during life. The pylorus itself was scarcely distinguishable, therefore no means existed which were fitted to prevent a constant and free communication betwixt the cavity of the elongated stomach and the duodenum. The duodenum descended obliquely along the right side and upper part of the tumor; and then took its usual course behind it. The cæcum was not materially altered in position; but the colon ascendens together with the arch of the colon passed transversely

over the tumor, somewhat below its middle, and was firmly adherent to it; the tumor being evidently placed between the lamina of the transverse meso-colon. The diaphanous omentum was stretched over the tumor, betwixt the great curvature of the stomach and the arch of the colon; and the omentum minus was put equally upon the stretch; the small intestines were thrust down into the pelvis and hypogastric region, where during life, they had been distinctly felt. The dense inferior part of the tumor rested on the mesentery. Before removing any part I looked carefully for a cicatrix which might mark the part through which the fluid must have escaped at the time the occurrences denoting a rupture of the cyst took place; but in this I was unsuccessful. I found the cyst thin and transparent, where it was covered by the omentum; thick, dense, and perfectly opaque below the arch of the colon. After raising the stomach from its situation, the pancreas was seen stretched out upon the cyst, and its transparent duct appeared running along the fore and upper part towards its opening into the duodenum. It was remarkably elongated, measuring nine inches. The little pancreas was widely separated from the larger portion of gland; remaining close to the duodenum at the termination of the elongated pancreatic duct. So much were these glandular substances compressed between the cyst and the upper layer of the transverse meso-colon, that in a hasty view they might have been passed by unnoticed. The splenic branch of the vena portæ also took its course on the

anterior surface of the cyst towards Glisson's capsule. This bundle of vessels answered the purpose of a firm ligament suspending the tumor. The posterior surface of the cyst rested chiefly upon the aorta, and was adherent to the left crus of the diaphragm. The cœliac artery, elongated, ran upwards and forwards to reach the superior part of the tumor, where its three branches were distributed in the usual manner. The superior mesenteric artery ran downwards towards the small intestines, closely adhering to the posterior part of the cyst; and behind it the duodenum crossed the spine as usual. The vena cava passed on the right side, unconnected with the tumor.

After having thus far ascertained the relative situation of the tumor, and removed it from the body, I punctured it: seventy-eight ounces, or four pounds fourteen ounces of a limpid fluid escaped, having the colour of an infusion of green tea, with a very slight tinge of blood. The opening was now dilated to expose the fleshy mass which had been felt during life, and it may be easily conceived that we were greatly surprised on finding that this substance had unequivocally the shape and characters of a human fœtus.

The preceding description of the situation of the cyst and its relation to the natural contents of the abdomen will be rendered more intelligible by a re-

ference to the first plate, which must not be considered an exact representation of appearances as they were exhibited on opening the body. The ingenious and accurate artist, Mr. Clift, had not an opportunity of seeing the parts in the state here represented; and had no other aid, than a loose and imperfect outline hastily made when the cavity of the abdomen was exposed.

The superior part of the figure represents the margin of the thorax, with the xiphoid cartilage (A); immediately below is seen part of the liver, with its ligamentum rotundum (B.); and the gall bladder (C.); the fundus of which is turned inwards and forwards, towards the linea alba. The great spheroidal cyst is seen extending upwards to the liver and diaphragm, and downwards to the ilia, thrusting the small intestines (D. D. D.) into the pelvis and hypogastric region. The stomach (E.) is lying on the upper part of the cyst; the duodenum (F.) passes over it obliquely downwards, and to the right. The situation of the pancreas (G.) is here pointed out; but its little glandular particles were so spread as, at first, to be hardly visible; its diaphanous and singularly elongated duct (H.) crosses the cyst and passes towards the duodenum. The colon ascendens together with the arch of the colon (I. I.) are placed transversely upon the cyst, below its middle, and adhere to it; the laminæ of the transverse mesocolon, having been separated from each other by the gradual increase of the cyst. The superior lamina

is spread over and adheres to the larger upper part (K); the inferior lamina is similarly connected with the inferior, less extensive portion (L.) and terminates at the commencement of the mesentery. Betwixt the stomach and the arch of the colon the omentum was stretched over the cyst, giving to it another but unadhering covering. Thus the omentum no longer formed a loose bag; but passed directly from the stomach to the colon as a mere duplicature of the peritoneum. It would be prolix and superfluous to notice in detail the manner in which this was effected as it will be easily understood by the anatomical reader, who will readily conceive how the progressive augmentation of the cyst, by displacing the parts to which the omentum is attached, gradually expanded the mouth of this peritoneal sack, until at length its internal surface became applied over the great distending tumor.

The external Appearances of the Fœtus.

THE surface of this singular monster was covered with a quantity of sebaceous matter, such in all respects as is often met with on the skin of infants recently born. When this was removed the creature appeared as rosy and as healthy as if it had been

yet alive. Its short and stout limbs were plump and firm; they were almost fixed in a posture resembling that in which the fœtus in utero is usually found. Its spine was greatly curved and formed a considerable rotundity backwards. The upper extremities laid close on each side of the trunk; the lower, which were remarkably short in proportion to their bulk, were drawn upwards towards the anterior part of the body, leaving the nates and genitals exposed below.

At the upper part of the trunk, above and between the shoulders was situated a dark red fleshy mass in the place of head, of which there was not any other vestige. This substance, when fresh, was plump and soft; careful dissection proved it to be of a texture resembling the pia-mater. It is plentifully supplied with blood vessels of considerable magnitude, but in no part of it could be found any substance resembling brain, nor could any nervous filaments be discovered in it. Across and into this substance ran a slender white cord, which was continued to the containing cyst and there attached; it measured about two inches and a half in length. This proved to be nothing more than a slip of dura-mater. Another portion of this membrane may be seen covering and adhering to part of the anterior surface of the mass of pia-mater. But the chief connection betwixt the containing cyst and the fœtus was found at the umbilicus; to this was fixed the

apex of a fleshy cone, the basis of which was formed by the inferior portion of the cyst, immediately before that part of it to which the beginning of the jejunum is attached. The side of this conical substance was of a full red colour, smooth, plump, and to the feel possessed a soft fleshy firmness.

The diameter of the base of the cone measured one inch seven-tenths.

Its extremity at the umbilicus, half an inch.

Its side, one inch three-tenths.

A diagonal incision through its dense circular base gave vent to a quantity of black tenacious matter much resembling the meconeum of infants; this, it was now found had been contained in several convolutions of intestine, one of which adhering to the part divided, had unavoidably been wounded: thus it appeared, that this fleshy cone was an exomphalos; but at the same time it formed an important bond of union betwixt the fœtus and the containing child, as will be shewn in the sequel.

What remains to be noticed in relation to the external appearances of the fœtus will be better explained by a reference to the plates.

The first plate, it has already been said, must be considered only as an ideal representation; but the

three following are most faithful deliniations, and give exact ideas of the size and shape of the fœtus and its various parts.

The second plate exhibits a front view of the fœtus.

At the upper part is seen the dark red mass of pia-mater (A.) which occupies the place of head and the white filament of dura-mater (B.) that connected it to the containing cyst. At the basis of this substance are seen two locks of fine long hair (C. C.) of a light brown colour; and beneath these, upon the thorax, two eminences (D. E.). One on the right (D.) is of a button like shape; its surface flat; its edge circular and rounded. It consists merely of common integuments padded with fat. The lesser eminence (E.) on the left, together with its stalk or peduncle (F.) by which alone it is connected with the body of the fœtus, contain the rudiments of a bony substance and some dense cellular membrane covered with common integuments.

At the umbilicus (G.) is seen a portion of the exomphalos; the greater part being supposed, in this drawing, to have been removed for the convenience of shewing in one view the whole of the anterior and inferior regions of the body. The breach (H. H.) is well formed. The clutch or separation betwixt the nates distinctly defined; but there is no anus. The genitals have all the external characters of the

male: a penis (I.) with a loose and rugous preputium; a glans penis denuded and most perfectly formed; with a distinct orifice to the urethra; this canal is not continued more than a line in the substance of the penis where it then terminates.

A scrotum (K. K.) divided into two parts towards the anus, but having no other character of labia. There is, however, an appearance under the penis, seen only when it is raised, which, at first sight renders the intended sex doubtful. A smooth red surface is seen, at the upper part of which is the aperture of a small and very short canal extending inwards not more than a line; this is probably the continuation of the urethra, as it begins nearly opposite the termination of that portion of the canal within the penis.

The right lower extremity consists of a very short thigh (L.); a distinct knee (M.); a very short leg (N.); a well marked ancle, and a correctly formed foot (O); the back of this foot rests against the shoulder of the same side, whilst the sole is turned directly forwards, the heel and outer edge of this foot and the hollow of the sole have all the most natural appearance; but the toes exceed the usual number; four very small separate phalanges furnished with nails hold the place of the little toe and its neighbour; next to these are two large indistinct toes, each furnished with a nail, and the great toe is split into two smaller well shapen toes with nails. If then we consider

the nails as pointing out the number of toes, it must be said that to this foot belong eight toes.

The left lower extremity is not equally well formed. A thigh, a knee, and a leg are easily distinguished; but the foot is greatly mishapen in the manner of a club foot; the sole is turned backwards, and rests against the body and left shoulder; the heel (P.) and the outer edge of the foot (Q.) being turned inwards. The toes differ materially from the ordinary arrangement: three little toes (R.) furnished with nails, lie evenly next each other towards the outer edge of the foot; whilst the great toe (S.) is seen projecting considerably outwards, like a thumb separated from the fingers; betwixt these is a short thick mis-shapen projection (T.) with a nail upon it. On this foot then there are five nails.

The left superior extremity, seen in this drawing, will be better explained by referring to the third plate.

The third plate contains the two side views. In the first figure is seen, in addition to a different view of some parts already enumerated, the right superior extremity, consisting of an arm, (A.) an elbow (B.) bent and pointed forwards; a forearm (C.) with the hand directed backwards, and resting against the side. The fingers are not complete either in number or form. There is one finger very well shapen; it has a perfect nail, the only one on this

hand; on each side of this there is an imperfect stump evidently intended for fingers.

This drawing shews the back of the right foot (D.) and its eight toes distinctly; together with the heel (E.); the ancle (F.); the leg (G.), and the knee (H.); the nates and genitals are likewise seen in part.

In the second figure may be seen the left superior extremity, the elbow (I.) of which is marked by a slight bend and a deep dimple; it consists of an arm, a fore-arm, a well marked wrist and a hand (K.) to which there are but two fingers; these are large, straight, and parallel; on each a nail is distinctly seen. This view again shews the left foot (L.) which has been somewhat removed from its natural position for the purpose of exhibiting it more distinctly.

Both the views in this plate shew the great curvature of the spine, and also a singular appearance, which almost entirely occupies the posterior region of the body: an abrupt termination of the common integuments on each side (M.) forms the boundary of a dark red surface, broad at the shoulders, and tapering to a point towards the sacrum, above which it terminates. On the integuments around it are a number of fine short erect hairs, which are more numerous towards the pelvis. Along the middle of this space, in the direction of the spine, runs a line or raphe, from each side of which pass off trans-

versely numerous filaments, the extremities of which hang loose, and, when floating in water their arrangement may be more distinctly observed. Their course is not straight; but rather serpentine and they send to each other, in an oblique direction, slender filaments of a similar structure; they become gradually shorter towards the inferior pointed extremity of this part. On each side of this part the dark red denuded surface is rough; but the villi, which give it this appearance, have not any uniform or regular arrangement; betwixt this and the edge of the integuments there is a margin of perfectly smooth and polished membrane.

The peculiar structure of this part rendered it a subject of curious attention in the dissection of the fœtus. On examining the spine it was discovered that there were no processes to the vertebræ, no vertebral canal, no spinal marrow; that the substance in question, plentifully supplied with blood vessels, lay on the posterior surfaces of the bodies of the vertebræ, thus occupying the place of the medulla spinalis.

From these circumstances it appears warrantable to conclude that it was intended to form the spinal marrow, and that it consists of the membranous and vascular materials which appertain to it.

Dissection of the Fœtus.

It now became a matter of more interesting enquiry to ascertain the structure of this singular production; to discover the organs it possessed; to determine what were its functions, and in what manner they were performed; to trace its mode of connection with the containing child, and thus to explain its nourishment and growth.

This required some deliberation and care; as much deviation from the ordinary structure and situation of parts might be expected; as all lay within a small compass, and at a great depth from the surface; owing to the bent position of the body, the fixed posture, the shortness and the great bulk of the limbs. Much of the aid which injections afford, was not in this case to be obtained. The discovery of so singular a phenomenon was of course not looked for; and the removal of the parts from the body took place under circumstances, which rendered the preservation of them hopeless. Many vessels were therefore wounded, which might have afforded means of filling their branches with wax. The cyst itself had been slit open, and the basis of the exomphalos divided, in order to examine its contents.

The investigation was begun by a perpendicular incision through the parietes of the abdomen, on the left side of the navel; and another, at right angles with this, slit the umbilicus open. A membranous pouch was now exposed, which appeared to occupy the whole cavity of the abdomen; from this proceeded an intestine through the umbilicus; but nothing else could be seen at this confined incision; and it therefore became necessary to make an extensive exposure of the whole interior. It appeared that this would be most safely effected by extending the vertical section, begun at the abdomen, through the thorax, down the spine and through the pelvis; as the corresponding edges of each portion of the section could be easily discovered and the course of divided vessels be traced without difficulty. This section is represented in the first figure of the fourth plate, in which the cavity and contents of the exomphalos are also displayed. The deficiency of vertebral canal and spinal marrow was now ascertained; the bodies of the vertebræ (N. N. N.) being the only parts of the spine which had been developed. The small cavity betwixt this and the anterior parietes of the body contains but few parts; and these do not bear any very close resemblance to the usual contents of the trunk. There was no diaphragmatic partition dividing this cavity into thorax and abdomen. There was no heart, no spleen, no liver, no urinary organs, nor any internal organs of generation. At its upper and posterior part, close to the vertebræ, lay a very vascular

substance of a pale rose colour; which, from its texture and situation, may be considered as intended for the lungs.

The alimentary canal is the most perfectly formed of the internal organs; part indeed of the intestines, situated in the exomphalos, is in all respects naturally constructed. Its commencement occupies the inferior and anterior part of the body, and entirely fills the pelvis; it consists of that pouch, which has been already noticed. The complete section of the body at once exposed its cavity, which was filled with a coagulum of florid blood. That portion of this pouch which occupies the pelvis (A.) gradually contracts towards the anus, where it terminates with an impervious point; so that there is not here any outlet. Behind the upper part of the pubis the substance of the pouch is folded transversely and forms a ridge, which projects considerably into the cavity. The extremities of this fold are gradually lost on each side in the substance of the pouch. Above this transverse partial septum the cavity is is again expanded, especially at its posterior part (B.) from whence commences a spiral course of the intestinal tube, narrowing in capacity as it passes towards the navel; giving to this part the appearance of a turbinated shell; the basis of which (B.) is in the cavity of the body and the apex passes out at the navel; there is, however, no modeolus around which this portion of the alimentary tube winds itself. A correct idea of the construction of this part may

be formed, by considering it as a conical tube, coiled, from right to left, like a cork screw or a well-staircase. It forms three complete turns; and, having passed out at the navel, terminates in a sudden enlargement of the intestinal tube (c.) which is the commencement of the first and most considerable convolution of intestine (c. d. e.) This passes along the side of the exomphalos to its basis, to both of which it adheres; it then bends its course backwards towards the body; this portion is unadhering; the concave edge gives attachment to the mesentery, in which the natural course of the blood vessels is readily seen. Having nearly reached the navel it again adheres (e.); then suddenly is lessened in capacity, forming a small tube of dense structure (f.) which terminates in a singular three-sided pyramidal body (g.), the apex of which is free. This body is of a firm fleshy consistence; its basis is united to the dense portion of intestinal tube (f.) just noticed, with which its narrow cavity is continuous. To one of its sides another convolution of intestine (h.) is attached, of less capacity and extent than that first described (c. d. e.). The aperture of communication between this intestine (h.) and the three-sided appendix is large enough to admit a probe. From this last mentioned knuckle of intestine, which is supported by a distinct portion of mesentary, the intestinal tube is continued behind the great convolution (c. d. e.) adhering to the basis of the exomphalos. It may be traced in the second figure of the fourth plate, in which the right side of the exom-

phalos is supposed to be removed and the parts hidden in the first figure are distinctly shewn. To preserve a distinct idea of the whole course of the intestines, the large convolution (C. D. E.) is here again seen terminating in the dense narrow tube (F); and the smaller convolution (H.) is seen arising from the three-sided appendix (G.) The remainder of the intestinal tube (L.) takes a tortuous course across the basis of the exomphalos to which it is firmly fixed, and terminates in the straight gut (K. L. M.) This capacious intestine closely adheres to the right side of the exomphalos, passing from its basis to the umbilicus near which it terminates by an external opening (M.) This intestine is, in the drawing, represented as slit open for the purpose of shewing the numerous folds of its internal surface; the termination (K.) of the preceding intestine (I.); and a small opening (L.) which leads to an external aperture (M.) through which a probe passed without force. Here then the anus is found; this outlet of the intestinal canal is situated on the right side of the exomphalos near the umbilicus.

It would be tedious to enter into a minute description of the bones of this fœtus; the following general remarks have therefore been deemed sufficient.

There is an irregular bony substance at the upper part of the trunk, which may be considered as in-

tended for the basis of the cranium. The spine, of which notice has already been taken, consists only of the bodies of the vertebræ, in which ossification has not been tardy. There are but few ribs, and these very short. The pelvis consists of a sacrum and two ossa innominata. The ileum is ossified, but the pubis and ischium are almost wholly cartilaginous. Of the cylindrical bones the bodies are ossified; but their apophises are cartilaginous. The carpus, the tarsus, and the phalanges are entirely cartilage. Some of the joints are well-constructed; the extremities of the bones which form them are covered with diarthrodial cartilage; they are united by firm liguments and lubricated by synovea.

Very little muscular substance is to be met with; there is not any on the posterior part of the trunk; the anterior parieties of the abdomen are composed solely of common integuments, adipose substance and peritonium. About the hip joints there are some slender portions of muscle; but little, if any, is discoverable in the remainder of the limbs; they principally consist of adipose substance.

One of the most singular circumstances in the structure of this creature is the total absence of brain, of spinal marrow, and of the nerves of sense and voluntary motion; but a distinct plexus of nerves is seen just within the umbilicus, about the commencement of the intestines, to which numerous branches are distributed.

The sanguiferous system is without a heart. It consists of two main trunks. One, which is ramified at each extremity, sends numerous branches from the middle of the basis of the exomphalos, into its laminated substance; which extend far beyond the circular limits, defined by the attachment of the side of the cone. The peculiar structure in which they ramify forms a considerable portion of the cyst as will be seen in the account given of this part. This trunk is then placed between the intestines (C. D. E. and H. I.) to which it sends branches; enters the umbilicus at its inferior part; passes first under and then to the right of the turbinated portion of intestine, and lastly enters the lung. It here divides into several branches, which are distributed to the extremities, to the spine, to the pelvis, and to the mass of pia-mater which holds the place of head.

The other great trunk is placed on the right side of the first in the lung; where it receives branches from the pia-mater, from the spine, from the pelvis, and from the extremities. As it passes out at the umbilicus it gradually separates from the first mentioned vessel, and takes a direct course between the inner surface of the side of the exomphalos and the straight gut (K. L. M.) Having reached the basis it runs a little way along its edge, and then takes an extensive course on the inner surface of the cyst towards the superior mesenteric vessels of the containing child near which it terminates. The consi

derable length of this vessel, it is evident, has been occasioned by the gradual augmentation of the cyst; it was so choked up by coagulated blood that quicksilver could not be made to run any distance in it, and though it could be traced to the neighbourhood of the superior mesenteric vessels, yet the greatest care and perseverance could not discover its mode of termination.

From what has been already stated it must appear that the containing cyst answered the purpose of a placenta to the fœtus, and it therefore becomes a point of some interest to enquire into its structure. The thickness of the cyst is various; it is thinnest at its fore and upper part, where it was covered by the omentum; and, when fully distended, it was at this part transparent. Here an appearance was met with which explained the escape and re-accumulation of the fluid contents noticed during life. A laceration is seen on the inner surface about half an inch in length, which leads to a separation, of the extent of three quarters of an inch, between the two layers of which this part of the cyst is composed. At the termination of this separation there is a small hole through the external coat. This appearance, it is probable, had been produced in the following manner:—the great accumulation of fluid occasioned the internal coat first to give way, and this small rupture was, by the same cause, gradually enlarged. The external coat opposite this part had now to sustain the whole increasing force of disten-

tion; till at length, yielding at the small point noticed, it allowed the fluid to escape into the posterior cavity of the peritoneum, and thence, under Glisson's capsule, into its anterior cavity. In the flaccid state of the cyst, produced by the partial evacuation of its fluid contents, its vessels would in part repair this breach, and the separated laminæ would again be brought into contact; so that a fresh accumulation of fluid would be prevented from escaping.

The thickest part of the cyst is its inferior portion; the middle of which forms the basis of the exomphalos. It receives a peritoneal covering, between the arch of the colon and the mesentery, from the inferior lamina of the transverse mezo-colon; the superior lamina of which is spread over the upper part.

The internal surface of the cyst is lined by a smooth delicate serous membrane, which is reflected over the side of the exomphalos, and terminates as abruptly at the navel of the fœtus as the peculiar structure of the funis appears to end at this part in a fœtus placed under ordinary circumstances. At some parts of the internal surface there is a scaly appearance resembling, in some degree, deciduous cuticle.

The substance of this cyst consists of several layers of considerable firmness; varying at different

parts in thickness and apparently in number. Opposite and to some extent around the exomphalos these laminæ appear much thicker, more numerous, and more distinct than elsewhere; this part can be shown to consist of eight laminæ; they appear distinctly in a vertical section; and separate readily. This part of the cyst receives a very considerable artery from the colica sinistra; this vessel sends branches round the basis of the exomphalos, whose subdivisions cross it in all directions; but no mesenteric vein accompanies this artery.

It may be here useful to recapitulate as much of the foregoing narrative as relates to the business of circulation. It has been seen that the fœtus is furnished with two vessels; a short one, obviously ramified at each extremity; the branches of one extremity meeting with numerous arterial branches of the containing child in the substance of the containing cyst; the other, a long vessel, separated during the greater part of its course from the first, running along the inner surface of the cyst and terminating abruptly at its posterior part near the superior mesenteric vessels of the containing child.

Here then arises a difficulty in the way of considering the cyst as answering the purpose of a pla-

centa; for to establish this opinion it would be requisite that each vessel should ramify in the substance of the cyst; and, that its branches should be so situated as to admit of communication with those of the other vessel. Although such an arrangement does not appear, it is however probable. The greatest caution and assiduity did not lead to the discovery of the manner in which the long trunk terminated; it could not be traced into any branch of the mesenteric vessels of the containing child; (yet, had this been the mode of termination, the size of the vessel renders it probable that it might have been detected); nor could any branches be shewn to proceed from it. Its extremity, however, inclines towards the exomphalos and is not more than an inch and a half from it; the substance of the cyst is here considerable, and of the same structure as that in which the other vessel ramefies, and of which it is a continuation; branches may therefore be sent into this part; but, as quicksilver could not be made to run into, or the eye to trace such branches, I am not authorized to assert their existence. It is, however, clear, that this vessel conveyed the venous blood of the fœtus from its body to the cyst, and that the fœtus was supplied with arterial blood from the cyst by the short doubly ramified vessel; but whether this vessel received its blood from the ultimate ramifications of the long venous trunk of the fœtus, or from the great arterial branch of the colica sinistra I am not able to determine.

Attempts were made to ascertain whether there existed any direct communication between the branches of the colica sinistra and the cystic branches of the short fœtal trunk; but the incision, which had been made through the cyst at the basis of the exomphalos, had divided the most considerable branches of both these vessels and allowed the quicksilver to escape too rapidly to admit of pressure from a considerable column. The injection did, however, run into some minute branches without in any instance entering the other set of vessels.

I here close the description of this extraordinary case, which, in conjunction with an account of a similar occurrence published a few years since, in a Bulletin de L'Ecole de Médicine, de Paris, will tend to affix some credibility to similar cases met with in authors; with regard to these, however, it is to be regretted that they do not contain that internal evidence of their truth which an anatomical account of the appearances displayed by dissection would afford.

OBSERVATIONS

ON

THE DISTEMPER IN DOGS.

BY EDWARD JENNER, M.D. F.R.S.

Read March 21, 1809.

THAT disease among dogs which has familiarly been called "the distemper," has not hitherto, I believe, been much noticed by medical men. My situation in the country favouring my wishes to make some observations on this singular malady, I availed myself of it during several successive years, among a large number of fox hounds belonging to the Earl of Berkeley; and from observing how frequently it has been confounded with hydrophobia, I am induced to lay the result of my inquiries before the Medical and Chirurgical Society.——It may be difficult, perhaps, precisely to ascertain the period of its first appearance in Britain. In this and the neighbouring counties, I have not been able to trace it back much beyond the middle of the last century; but it has since spread universally. I knew a gentleman who, about forty-five years ago, destroyed

the greater part of his hounds, from supposing them mad, when the distemper first broke out among them; so little was it then known by those the most conversant with dogs. On the continent, I find it has been known for a much longer period. It is as contagious among dogs as the small-pox, measles, or scarlet fever among the human species; and the contagious miasmata, like those arising from the diseases just mentioned, retain their infectious properties a long time after separation from the distempered animal. Young hounds, for example, brought in a state of health into a kennel where others have gone through the distemper, seldom escape it. I have endeavoured to destroy the contagion, by ordering every part of a kennel to be carefully washed with water, then white-washed, and finally to be repeatedly fumigated with the vapour of marine acid; but without any good result.

The dogs generally sicken early in the second week after exposure to the contagion. It is more commonly a violent disease than otherwise, and cuts off, at least, one in three that is attacked by it. It commences with inflammation of the substance of the lungs, and generally of the mucous membrane of the bronchiæ. The inflammation at the same time seizes on the membranes of the nostrils, and those lining the bones of the nose; particularly the nasal portion of the ethmoid bone. These membranes are often inflamed to such a degree, as to occasion extravasation of blood, which I have observed coagu-

lated on their surface. The breathing is short and quick, and the breath is often fetid. The teeth are covered with dark looking mucus. There is frequently a vomiting of a glary fluid. The dog commonly refuses food, but his thirst seems insatiable, and nothing seems to cheer him like the sight of water. The bowels, though generally constipated as the disease advances, are frequently affected with diarrhœa at its commencement. The eyes are inflamed; and the sight is often obscured by mucus secreted from the eye-lids, or by opacity of the cornea. The brain is often affected as early as the second day after the attack. The animal becomes stupid, and his general habits are changed. In this state, if not prevented by loss of strength, he sometimes wanders from his home. He is frequently endeavouring to expel, by forcible expirations, the mucus from the trachea and fauces, with a peculiar rattling noise. His jaws are generally smeared with it, and it sometimes flows out in a frothy state, from his frequent champing. During the progress of the disease, especially in its advanced stages, he is disposed to bite and gnaw any thing within his reach. He has sometimes epileptic fits, or quick successions of general, though slight convulsive spasms of the muscles. If the dog survives, this affection of the muscles continues through life. He is often attacked with fits of a different description. He first staggers, then tumbles, rolls, cries as if whipped, and tears up the ground with his teeth and fore-feet. He then lies down senseless and exhausted. On re-

covering he gets up, moves his tail, looks placid, comes to a whistle, and appears in every respect much better than before the attack. The eyes, during this paroxysm, look bright, and unless previously rendered dim by mucus, or opacity of the cornea, seem as if they were starting from the sockets. He becomes emaciated, and totters from feebleness in attempting to walk, or from a partial paralysis of the hind legs. In this state he sometimes lingers on till the third or fourth week, and then either begins to shew signs of returning health (which seldom happens when the symptoms have continued with this degree of violence) or expires. During convalescence, he has sometimes, though rarely, profuse hæmorrhage from the nose. When the inflammation of the lungs is very severe, he frequently dies on the third day. I knew one instance of a dog's dying within twenty-four hours after the seizure, and in that short space of time the greater portion of the lungs was, from exudation, converted into a substance nearly as solid as the liver of a sound animal. In this case, the liver itself was considerably inflamed, and the eyes and flesh universally were tinged with yellow, though I did not observe any thing obstructing the biliary ducts. In other instances, I have also observed the eyes looking yellow.

The above is a description of the disease in its severest form; but in this, as in the diseases of the human body, there is every gradation in its violence.

There is also another affinity to some human diseases, viz. that the animal which has once gone through it, very rarely meets with a second attack. Fortunately, this distemper is not communicable to man. Neither the effluvia from the diseased dog, nor the bite, have proved in any instance infectious; but as it has often been confounded with canine madness, as I have before observed, it is to be wished that it were more generally understood; for those who are bitten by a dog in this state, are sometimes thrown into such perturbation, that hydrophobic symptoms have actually arisen from the workings of the imagination. Mr. John Hunter used to speak of a case somewhat of this description in his lectures*. Having never, to a certainty, seen a dog with hydrophobia, I am of course unable to lay down a positive criterion for distinguishing between that disease and the distemper, in the precise way I could wish; but if the facts have been correctly stated, that in hydrophobia the eye of the dog has more than ordinary vivacity in it, and as the term implies, he refuses to take water, and shudders even at the sight

* A gentleman who received a severe bite from a dog, soon after fancied the animal was mad. He felt a horror at the sight of liquids, and was actually convulsed on attempting to swallow them. So uncontrolable were his prepossessions, that Mr. Hunter conceived he would have died, had not the dog which inflicted the wound been fortunately found and brought into his room in perfect health. This soon restored his mind to a state of tranquillity. The sight of water no longer affected him, and he quickly recovered.

of it, while in the distemper he looks dull and stupid, is always seeking after water, and never satisfied with what he drinks, there can be no loss for a ready discriminating line between the two diseases.

TWO CASES

OF

SMALL-POX INFECTION

COMMUNICATED

TO THE FŒTUS IN UTERO UNDER PECULIAR CIRCUMSTANCES,

WITH

ADDITIONAL REMARKS.

BY EDWARD JENNER, M. D. F. R. S.

Read April 4, 1809.

IN my second* and third treatises† on the vaccine disease, I endeavoured to call the attention of my readers to some physiological facts respecting the nature of the small-pox infection which I considered of great importance, foreseeing that they would eventually become connected with vaccination.

* Further observations on the Variolæ Vaccinæ, published in 1799.

† A continuation of Facts and Observations on the Variolæ Vaccinæ, published in 1800.

My own observations, and the accumulated evidence of others, have furnished me with numerous instances of incontestible, and sometimes violent symptoms of small-pox occurring in persons who had previously gone through the disease, either in the natural way or by inoculation; mildly or severely. The skin we know is ever ready to exhibit, though generally in a very limited degree, the effects of the poison when inserted there, and how frequently do we see eruptions on persons much exposed to the contagion, and these sometimes preceded by sensible illness! Yet should any thing like an eruption appear, or the smallest degree of indisposition occur on the insertion of the variolous matter in those who have gone through the cow-pox, my assertions respecting the peculiarities of the disease might be unjustly discredited.

In the publications above mentioned, I have given the particulars of several instances of severe disease from variolous contagion, occurring in persons who had incontestibly gone through every stage of small-pox at a former period. The subjects of three of these cases were medical practitioners, two of whom had inoculated themselves by way of experiment, and the other received the disease by the contagious effluvia of a patient, in the course of an assiduous attendance. In another case, the subject was a nurse-maid, who also caught the disease by effluvia; and in another, extracted from the Memoirs of the Medical Society, (which is one of the most remark-

able cases on record) the patient had the small-pox a second time with such severity as proved fatal, though the first attack had been of the most malignant kind.

These circumstances have led me to entertain the opinion, that the susceptibility to receive variolous contagion always remains through life, but under various modifications or gradations, from that point where it passes silently and imperceptibly through the constitution (as is frequently the case with cow-pox) up to that where it appears in a confluent state, and with such violence as to destroy life.

It is only under particular circumstances, that any proof of the presence of small-pox can be adduced in those cases, in which it passes through the frame without producing eruptions, or in any perceptible degree disturbing the animal functions. Such proof however, is afforded by the obvious infection of the fœtus before birth communicated through the mother, herself being already secure from any visible occurrence of the disorder.

The following remarkable cases will exemplify this fact.

About five years ago, I was requested by Dr. Croft to vaccinate the infant of Mrs. W. a lady in Portland Place. The vaccine fluid, which was inserted fresh from the arm of another infant, pro-

duced scarcely any effect beyond a little efflorescence on the part, which in a few days disappeared. On expressing my surprise at this, such an occurrence happening very rarely, Mrs. W. soon removed my embarrassment, by the following narrative.

A few days previous to her confinement, she met a very disgusting object, whose face was covered with the small-pox. The smell and appearance of the poor creature affected her much at the time; and though she mentioned the circumstance on her return home, she had no idea that her infant could suffer from it, having had the small-pox herself when a child. During a few days after its birth, the little one seemed quite well, but on the fifth day it became indisposed, and on the seventh the small-pox appeared. The pustules, which were few in number, maturated completely. Dr. Croft, who attended her, being curious to know the effect of inoculation from one of the pustules, put some of the matter taken from one of them, into the hands of a gentleman eminently versed in that practice, which produced the disease correctly. Mrs. W. was not sensible of any indisposition herself from this exposure, nor had she any appearance of the small-pox.

This case then decisively proves, that the small-pox virus may affect the human frame, even to its inmost recesses, although apparently secured from its effects, and yet give no evidence of its presence by exciting any perceptible disorder.

Another case, in its general character similar to the above, was lately communicated to me by Mr. Henry Gervis, a surgeon of eminence at Ashburton, in Devonshire. Mr. Gervis says, "The small-pox having appeared in the village of Woolson Green, about three miles from Ashburton, on the 6th of May, 1808, I vaccinated a poor woman, the wife of James Baskwell, who was in the last month of her pregnancy. Her three children had been inoculated the preceding day with variolous matter by the surgeon who attended the poor of the parish, and who had very properly declined inoculating her also from her particular situation. I made two punctures in each arm, each of which fortunately succeeded, and she regularly passed the disorder, complaining only on the tenth and eleventh days, when the areola was most extended as is usual. I saw her very frequently during the progress of her disorder, and once or twice after its complete termination: I therefore can speak positively, that during that time she laboured under no symptom but what is connected with the cow-pox. From this period she continued perfectly well; and on Saturday last the 11th instant, she was delivered of a female child, having at the time of its birth many eruptions on it, bearing much the appearance of small-pox in the early stage of the disease. This event happened five weeks after her vaccination, and one month after she had been exposed to the variolous infection of her own three children, and that of several other persons in the same village. On the 14th I visited the child again,

when I found the eruptions had increased to some thousands, perfectly distinct, and their character well marked. Many among the most respectable physicians and surgeons from Totness, Ashburton, and the neighbourhood, were kind enough, at my request, to come to the poor woman's place of abode, and witness the fact. But to put the matter beyond all doubt, I armed some lancets with the virus, and produced the small-pox by inoculating with it. On the 18th the infant was seized with slight convulsions, and on the morning of the 19th it expired.

" In addition to the circumstance of the mother's conveying the variolous infection to her unborn child, without feeling any indisposition from its action on her own constitution, I must remark that there cannot be a stronger proof of the efficacy of vaccine inoculation than this case affords. But happily proofs are not wanted, or I could give my testimony to a great extent."

Without producing more examples of a similar description at present, though many are before me, I shall conclude by observing, that a fact not unlike the preceding fell under the observation of Dr. Mead, who, in his discourse on the small-pox (chap. iv. page 337, edit. 1772) says, " A certain woman, who had formerly had the small-pox, and was now near her reckoning, attended her husband in the distemper. She went her full time, and was delivered of a dead child. It may be needless to observe that she did

not catch it on this occasion; but the dead body of the infant was a horrid sight, being all over covered with the pustules; a manifest sign that it died of the disease before it came into the world."

My principal object in the foregoing observations is, to guard those who may think fit to inoculate with variolous matter, after vaccination, from unnecessary alarms: a pustule may sometimes be thus excited, as on those who have previously gone through the small-pox; febrile action in the constitution may follow; and, as has been exemplified, a slight eruption.

At the commencement of vaccination I deemed this test of security necessary; but I now feel confident that we have one of equal efficacy, and infinitely less hazardous, in the re-insertion of the vaccine lymph.

November 18, 1808.

HISTORICAL ACCOUNT

OF

PHILIP HOWORTH,

A BOY,

IN WHOM SIGNS OF PUBERTY COMMENCED AT AN EARLY AGE.

BY ANTHONY WHITE, M. B.

ASSISTANT SURGEON TO THE WESTMINSTER HOSPITAL.

COMMUNICATED BY DR. YELLOLY.

Read March 7, 1809.

THE histories of remarkable children have been transmitted to us from the days of Pliny the elder, who lived in the reign of Vespasian. Philemon Holland, his translator, in book vii. chap. 16, has the following observation:—"It is well known that there be some that naturally are never but a foot and an half high; others again somewhat longer, and to this height they came in three years, which is the full course of their age, and then they die." We read moreover, in the chronicles, that in Salamis, one Euthimenes had a son who in three years grew to be three cubits, or four feet and a half high, but

he was in his gait slow and heavy, and in his wit as dull and blockish, howbeit in this time overgrown he was, and his voice changed to be great, and at three years' end died suddenly of a general cramp.

*An account is also given by Craterus, the brother of king Antigonus; the subject of which history was an infant, a young man, a mature man, and an old man, was married and begat children, and all in the space of seven years!

In January, 1747, Dr. Mead presented to the Royal Society the history of an extraordinary child, born at Willingham, near Cambridge, which is to be found in the Philosophical Transactions for the year 1745, vol. 43. This child, according to the relation of his historian, Thomas Dawkes, surgeon, at St. Ives, near Huntingdon, was not only remarkable on account of his bulk and height, but also for the external marks of puberty which were first observed at the age of twelve months. No evidence, however, has been given of the perfect developement of the genital organs; their external appearance has alone been described, without any regard to the state of their functions. In an account published after the death of this boy by the same biographer, it appears, that at the age of five years

* Κράτιρος δὲ φυσιν ὁ Αντιγονου τῦ βασιλέως ἀδελφός, γινώσκειν τινα ἄνθρωπον ὃν ἐν επτα ἔτεσιν, παῖδα γενέσθαι, και μειράκιον, και ἄνδρα, και γέροντα, και γήμαντα, και παῖδο ποιησάμενον ἀποθανειν.

Phlegon de Mirab. cap. xxxii.

he was attended by the late Dr. Heberden, (then resident in St. John's College, Cambridge) on account of a disease resembling phthisis pulmonalis, of which he died in a few months, and, as Dawkes expresses it, " he had the appearance when dead of a venerable old man."

In the early part of the month of August, 1808, I was informed of a boy in whom some remarkable changes had happened, at a very early age. His history well deserves the attention of the philosopher, and forms the subject of the present memoir.

Philip Howorth was born in Quebec Mews, Portman-square, on February 21, 1806*. His parents are middle aged, and poor but industrious people. The father is a coachman in a gentleman's service, and the mother is constantly employed in nursing and rearing a family of ten children, of which Philip is the ninth. The father is a healthy and muscular man; the mother a middle sized woman and rather delicate; the rest of the children are of the ordinary stature and appearance.

During the mother's pregnancy with Philip, (which continued the usual length of time) nothing occurred worthy of remark. At the birth, the head of the child was covered with a profusion of hair of a considerable length; the sutures of the cranium were closed, not leaving the smallest vestige of a

* This information I obtained from the parish register.

fontanelle; and he was at this period considered, in point of size and appearance, as a large and healthy child. At seven months he had cut the two lower dentes incisores, and in a few months from that period he became possessed of twenty teeth. The regular order of dentition does not appear to have been observed; since after the appearance of the two inferior incisores, all the other teeth were observed protruding through the gums at the same time, accompanied however by no inflammation of the gums, or irritability of the bowels. During his first year he was remarkably healthy, and could, at about the twelfth month, run alone. It may be here observed, that his hair had grown to a great length, and hung in curls round his forehead, and down his neck. Shortly after the completion of the first year, a very evident alteration in his appearance was observable; his countenance, which, until now, had been marked with health and infant beauty, rapidly underwent a complete change; his features lost their round and infantile form, and became long, pale, and extremely ugly, as if affected by the presence of some bodily disease. These appearances seem to have been the necessary preludes of those remarkable charges which quickly succeeded. At this period nature made a sudden bound to puberty; the penis and testes were observed to increase in size; and a small number of black curling hairs were discovered on the pubes. An evident alteration also took place in the tone of voice, his cries becoming more hoarse and interrupted.

The peculiar organic changes which have been mentioned as commencing on the completion of his first year continued to be rapidly increased, and when the various organization which is developed at at the period of puberty had become more evolved, the signs of returning health became very apparent; the features began to assume an appearance far different from that of an infant; and the rapid growth of the body in succession became the wonder of all who knew him. No exact admeasurement, however, had been taken of his progressive increase, and until he had nearly attained the age of two and a half years, he had engaged only the attention of their neighbours in the Mews, where he was born, and with whose children he has associated and been brought up.

It now remains for me to present to the Society that part of his history and description which has fallen under my own notice. From my repeated visits, a perfect acquaintance and familiarity with the boy has been established; and he has been induced to visit me frequently at my own house, where, as he acts without restraint, I had most favourable opportunities of becoming acquainted with whatever is remarkable in his formation, or interesting in his natural history. On the first view of the boy, the manly character, strongly expressed in his countenance, is extremely striking; the features are rather broad, the head small, but well formed; the eyes blue, the hair brown and coarse, the eye-brows

large, and the complexion rather brown. On viewing the body naked from the pelvis upwards, he is nearly the exact representation of the Farnese Hercules reduced. The pectoral and serrati muscles, the abdominal, and those of the neck are eminently conspicuous; the muscles of the back, and around the scapulæ, are also remarkable; the arm is truly herculean; the deltoid, when in powerful action, swells to an astonishing thickness, and its insertion is well marked; the fore-arm is muscular, the hand large, with the common integuments remarkably hard; the contour of the neck is beautiful, marking, from its formation where it joins the dorsal vertebræ, excessive strength; the chest is broad and fleshy. The lower extremities are somewhat curved, a circumstance, I imagine, occasioned by the great weight of trunk which they had to support, at a time when the bones had but little power of resistance; the muscles, however, on the thigh and leg do not correspond in size with those of the upper extremities; the foot is broad and well marked.

The throat is full, and the thyroid cartilage is large and projecting; the voice resembles that of a young man of sixteen, and he is capable of whistling very low tones; his laugh is loud, and strongly indicates the changes which have happened to the cartilages of the larynx.

The chin is without beard, but the black-headed points of steatomatous matter are observable in the

skin, which are remarkable in young men previous to the growth of beard.

The teeth, on comparing them with those of other children, are rather more distant than usual; and here I may mention, that within the last month, all the incisores have become loose, and one has fallen from the upper jaw.

The nipple is prominent, and the areola well marked and incircled with a small quantity of hair. The axilla is without hair, but the secretion has the peculiar characteristic odour of the adult.

The pubes and scrotum are covered with black curling hair. The penis and testes are as large as I have seen in some adults. The corpus spongiosum urethræ has outgrown the corpora cavernosa, which gives the penis a considerable curve, when in a state of erection. The testes are firm and perfect in their formation, and the cord may be distinctly felt; the prepuce is easily drawn back over the glans, and the secretion of the glandulæ odoriferæ is apparent; the usual brown appearance of the integuments of these parts is also here to be observed.

I have subjoined a table of admeasurement of the principal parts of the body. His height and weight I ascertained in August, 1808. The dimensions, however, of the other parts were taken, with great accuracy, in January, 1809.

Dimensions of Philip Howorth, taken August, 1808.

Height, ... 3 feet 2 inches.
Weight, ... 47 pounds.

Dimensions taken in January, 1809.

Height, . . . 3 feet 4½ inches.
Weight, 51¼ lbs. or 3 stone 9¼ lbs.

	Inches.
Measure round his neck	12½
Round his cranium	20
Round the waist	24
From the inner edge of each glenoid cavity across the chest	12
From head of humerus to wrist . . .	13½
Over the deltoid muscle	9
Over the biceps	7
Round the wrist	6¼
Length from the great trochanter to the ancle	17½
Round the thigh	13½
Round the calf	8
Length of foot	6
Round the convex part	6½
Length of penis, as pendent	3
——— when erect	4½
Circumference of penis, when erect . .	4
——— of the scrotum, testes, and penis	8

We naturally suppose that a just union of health and excessive growth are incompatible. The continuance however of perfect health, during this rapid increase of height and bulk, has been in this subject very remarkable*.

In the history of the boy related by Pliny, he describes him as stupid and dull of intellect; the reverse of this however is found in this boy. His understanding seems equal to that of a child of six years old, and many of his observations and inquiries appear to have been the result of mature reflection. It must however, be observed, that his general character is marked with a considerable mixture of childish playfulness. How far he is capable of receiving scholastic instruction has not yet been ascertained. His disposition is mild, not easily provoked to anger. When, however, his rage is excited, it is not expressed in the usual manner of children, but by the lowering of the eye-brows, shaking of the head, and uplifted fist. Indeed, on all occasions the features strongly express the presence of any passion influencing the mind. He possesses very considerable strength, being able to lift a weight of forty pounds without much exertion. He has a talent for music, and sings with correctness some

* Minimè prætereundum est, quod hic puer virilis, manstupratione interdum utitur. Semen tali modo paratum, ipse ego bis vidi; et, me judice, perfectum et bene elaboratum evadit.—This has taken place, the mother informs me, from the completion of the second year.

tunes learnt from the grooms in the mews where he lives. It is worthy of remark, that he retains a very close resemblance of countenance to the rest of his family, and nothing of monstrosity is to be found except the curved state of the lower extremities, the cause of which I have attempted to account for. His food has been very simple, and chiefly of the farinaceous kind; his choice however, appears to be animal food, of which he eats enormously and with great eagerness.

From a review of this history I think we may safely infer, that the changes which have taken place in this boy had their origin in utero. The developement of the genital and other organs after birth has been extremely rapid, but remarkable for regularity. The unhealthy age of boys which happens about the fourteenth year, was in this subject strikingly marked at the age of one year. His rapid bound to the state of puberty, and consequent restoration of health and vigour, is precisely what happens to young men, on their arrival at the adult state.

From the perfect formation of parts essential to the continuance of health, a reasonable prospect is offered of this extraordinary subject arriving at a comparative maturity of years, and it is my intention to lay before this Society, at particular periods, whatever may occur in his future history worthy its acceptance.

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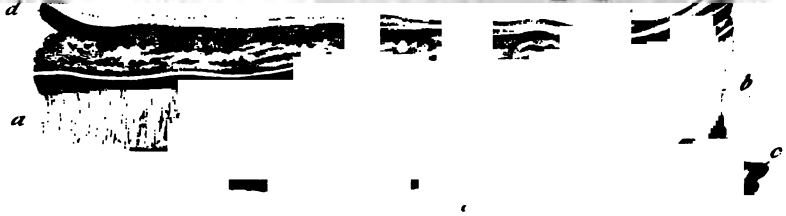
Fig. 1.

Fig. 2.



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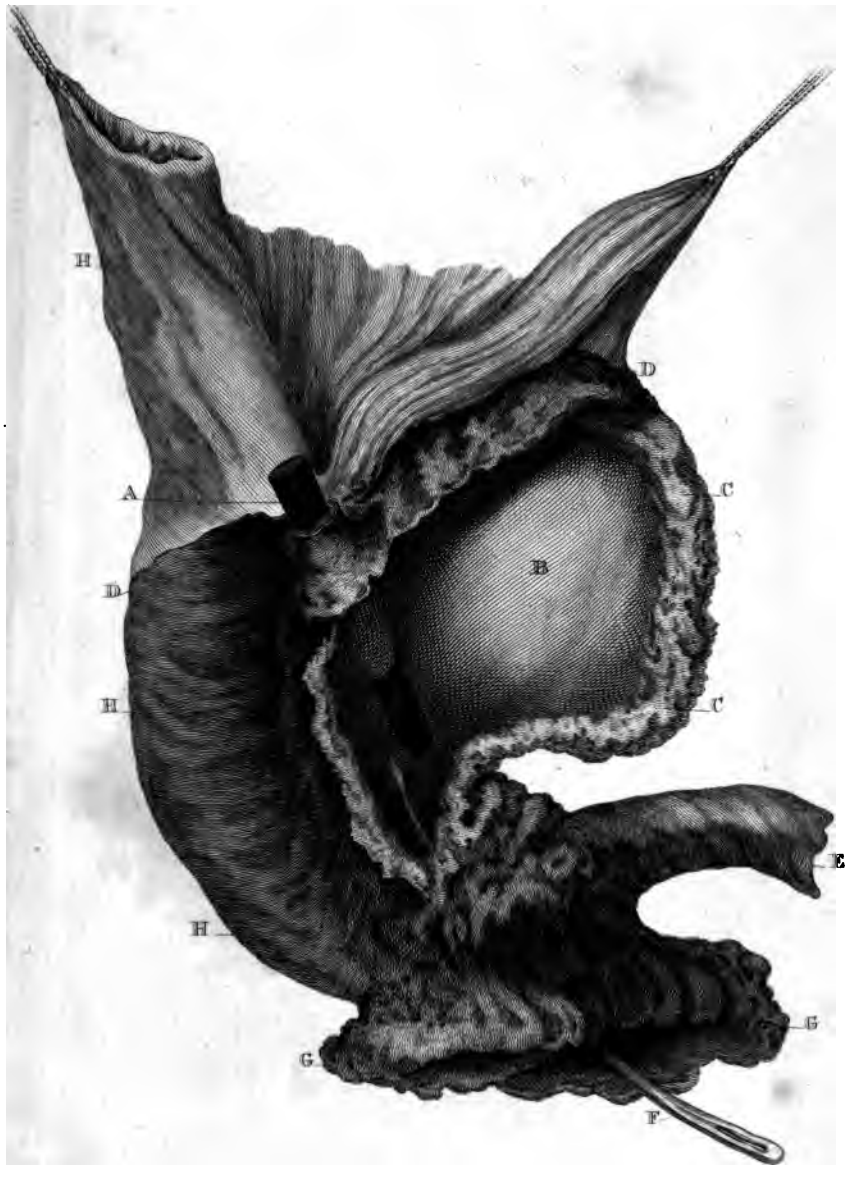

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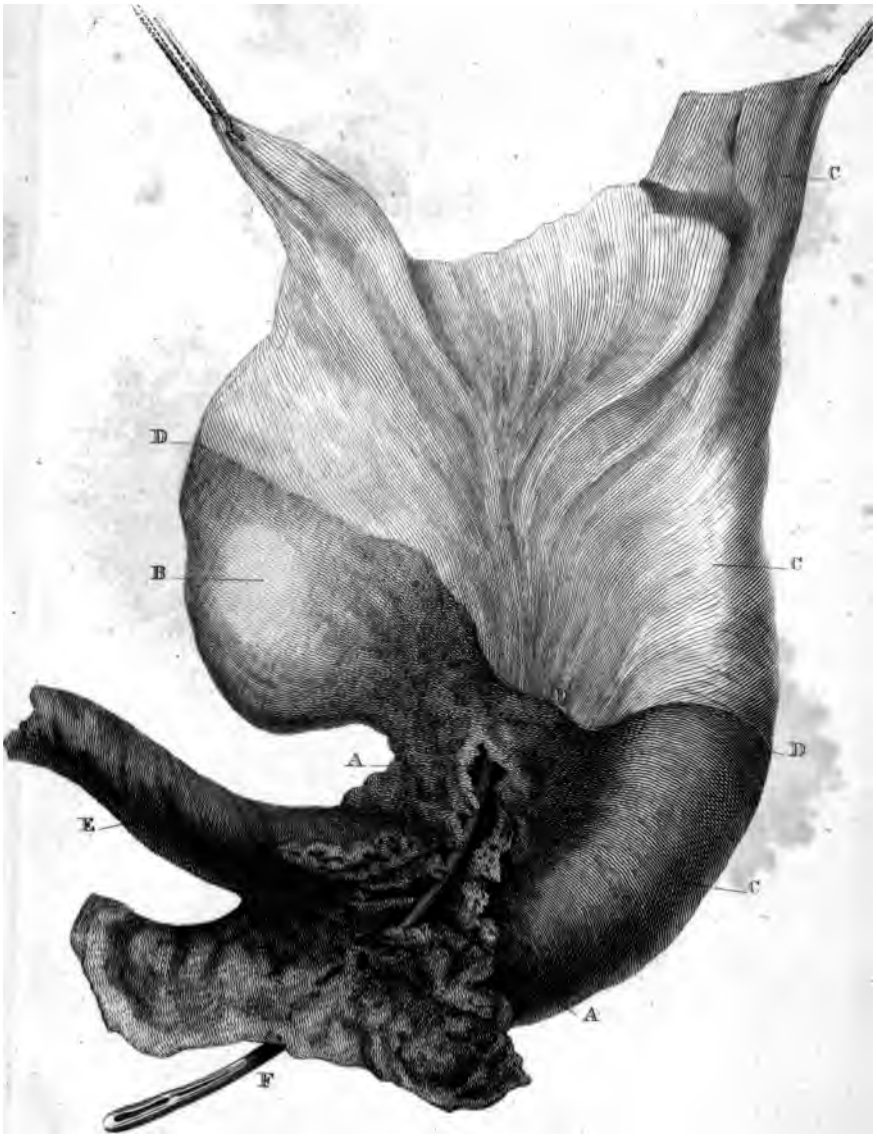

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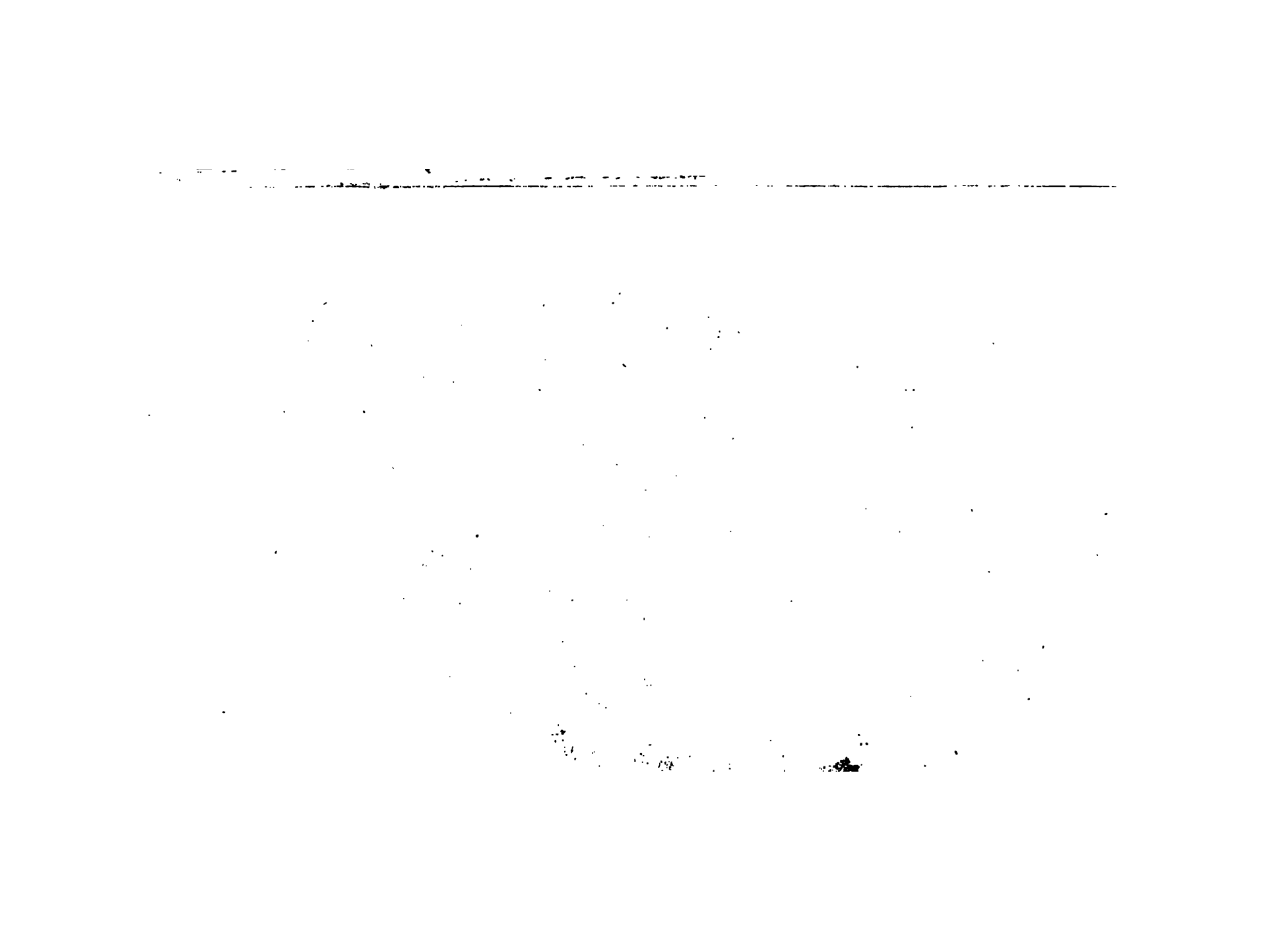

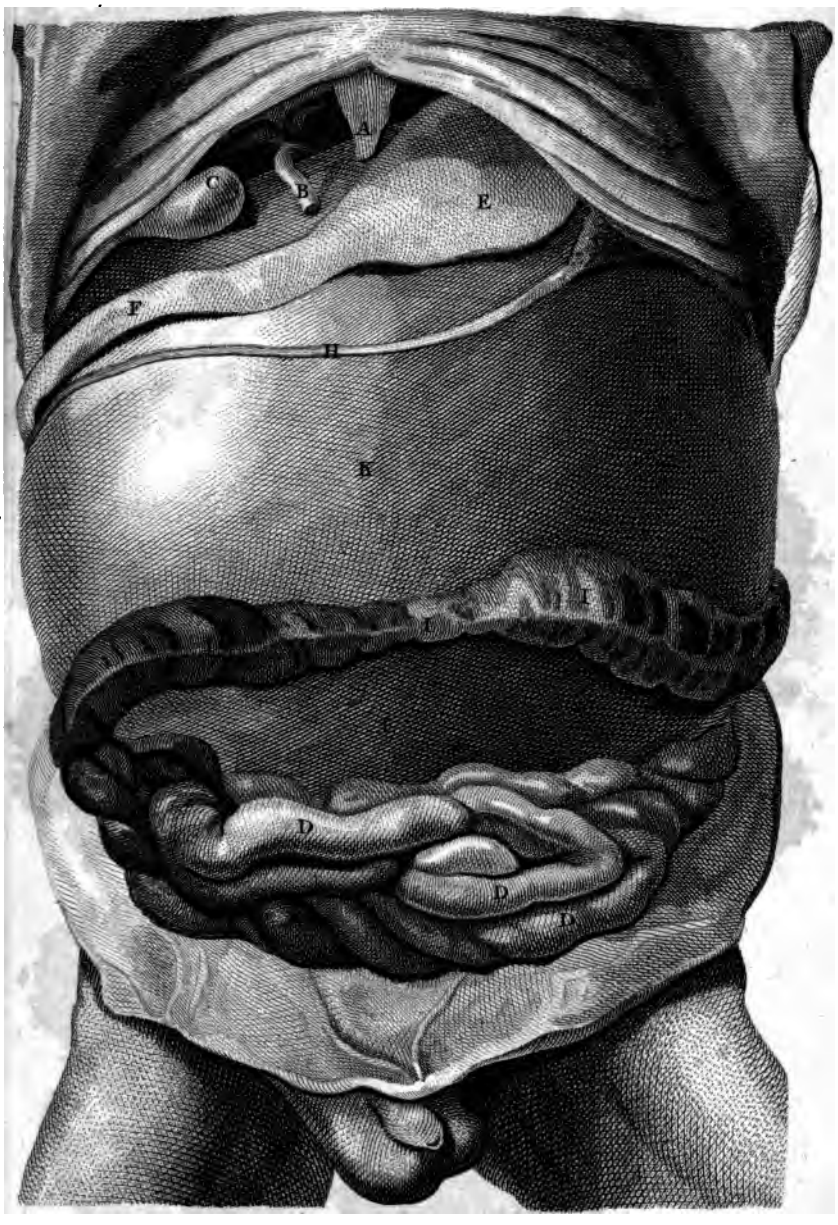

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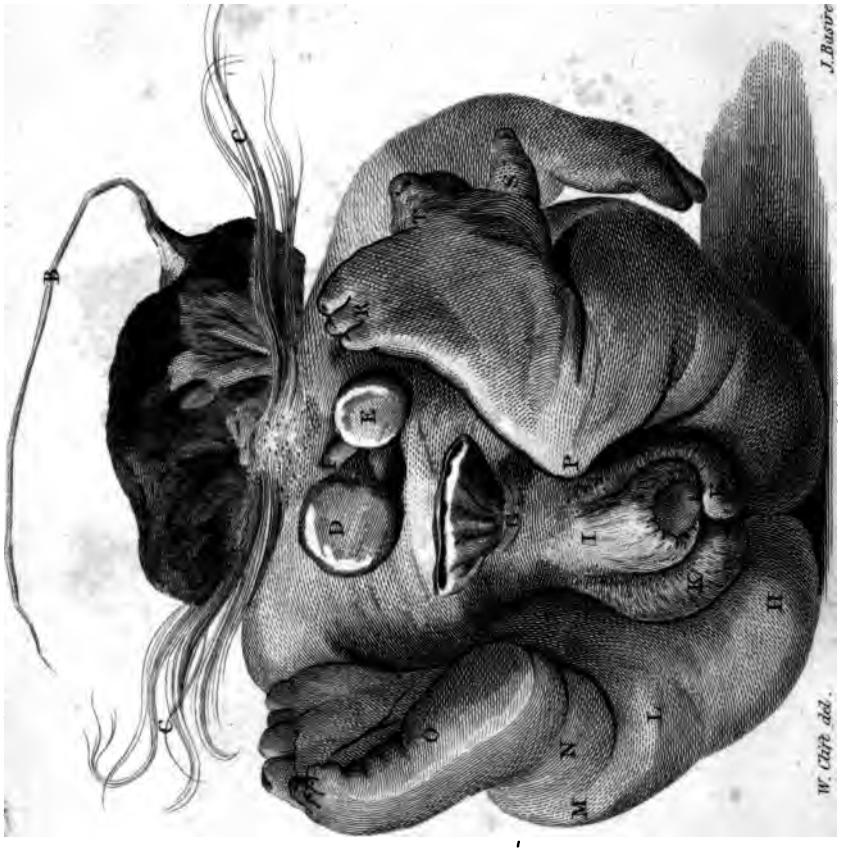

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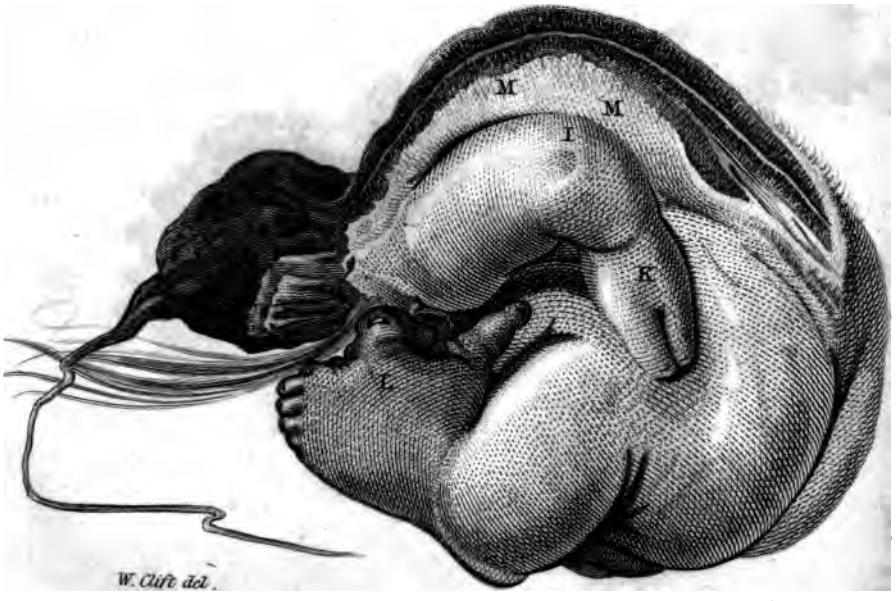

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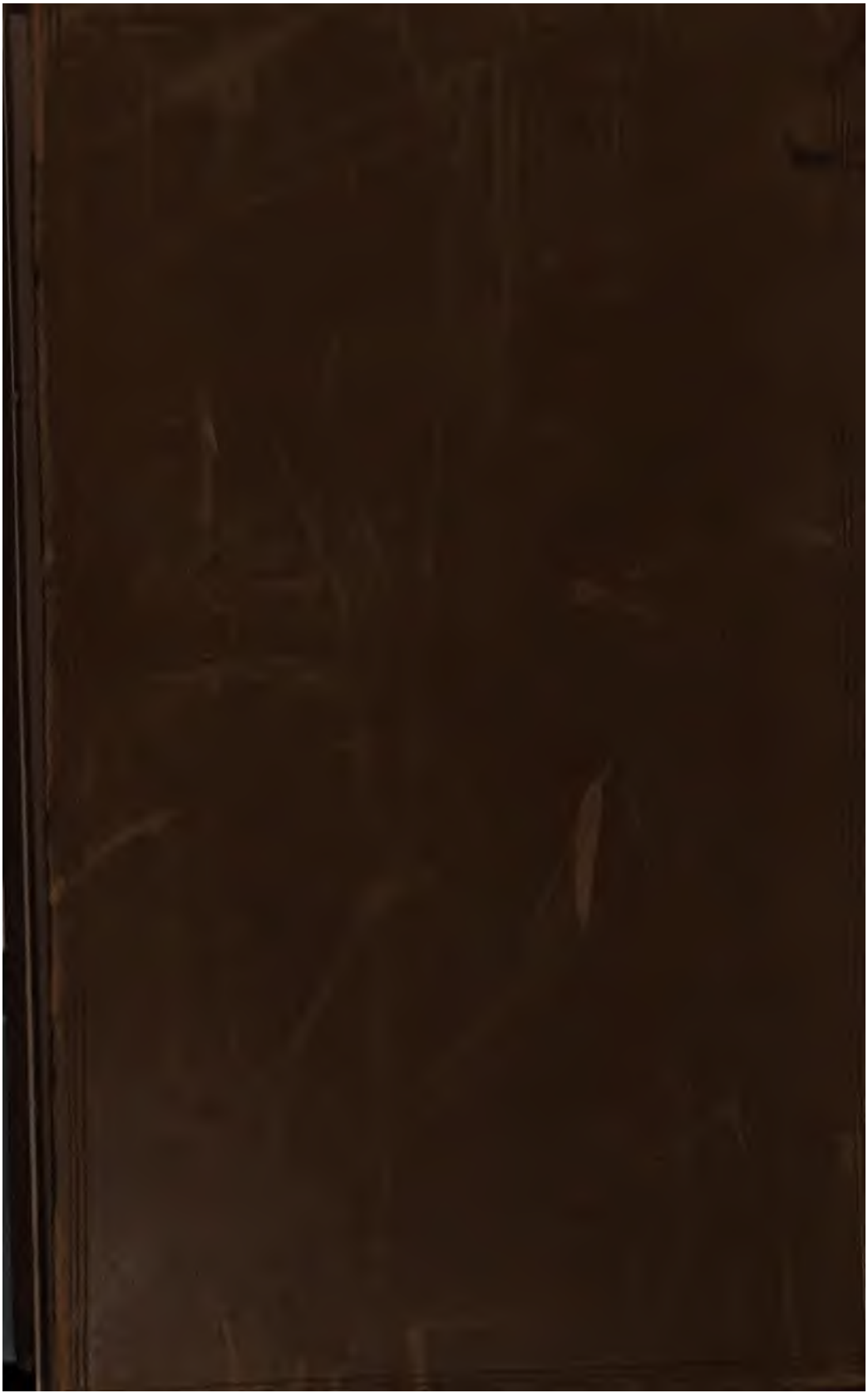
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